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Urbanization of Rural Landscapes II: Second Syllabus and Teaching Materials from a University Course, Spring 2000

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**EXTENSION AND EDUCATION MATERIALS FOR
SUSTAINABLE AGRICULTURE
VOLUME 12**

Urbanization of Rural Landscapes II

**Second Syllabus and Teaching Materials
from a University Course, Spring 2000**

**Charles Francis and David Mortensen
Editors**

University of Nebraska -- Lincoln

**Center for Sustainable Agricultural Systems
Department of Agronomy**

June, 2000

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Urbanization of Rural Landscapes II

Second Syllabus and Teaching Materials from a University Course, Spring 2000

Editor's Introduction & Executive Summary

Citizens in the U.S. and elsewhere are becoming more aware of the long-term impacts of urban sprawl and the loss of valuable rural farmland. Articles in the press as well as documentary programs on television indicate that people are beginning to take some of the early warning signals more seriously. Although this country appears to have plenty of land, there is an accelerating loss of farmland to development and a loss of landscape and ecosystem function that will soon undermine our livelihoods as well as quality of life in both rural and urban settings.

The challenge is growing rapidly. Each new citizen added over the past two decades occupies more than twice the land area used by existing citizens up to that point. This is counterintuitive, if we assume that more people can use existing facilities, public lands, and infrastructure more efficiently. The opposite appears to be happening, as we expand our malls, highways, schools, and especially acreage developments. Large houses with few occupants spring up on large lots or mini-farms in the surrounding landscapes of many communities. The majority of this land is lost for agricultural production, although it does retain some of its potential for ecosystem services. There is little consideration of the mid-term or long-term consequences of this massive transformation of productive land.

Urbanization of Rural Landscapes is a course first taught in Spring 1999 by Richard Olson and David Mortensen, using as a reference the newly published book *Under the Blade: The Conversion of Agricultural Landscapes* (Richard K. Olson and Thomas A. Lyson, editors; Westview Press, Boulder, Colorado, 1999). From that course, Dr. Olson prepared a syllabus that was printed in this same series of Extension and Education Materials for Sustainable Agriculture, Volume 11 (June, 1999). We gratefully acknowledge Richard Olson's important skills and energy in the organization of the original course and thank him for the energy that has extended into the second year of teaching this important topic.

Volume 12 provides supplementary information that updates the prior syllabus and adds materials used in the second course: articles with commentaries, reports on the term project, evaluations. We also include one class project from the 1999 course with key recommended changes in the Lincoln-Lancaster County Comprehensive Plan. Key materials included in the 1999 Syllabus are not duplicated here, thus both volumes are needed to get a complete picture of the content of the course. Copies of Volumes 11 and 12 are available from University of Nebraska at the address shown. Special appreciation is extended to Lynn Darling for supplying a number of the key references included in this volume.

Charles Francis & David Mortensen
Lincoln, Nebraska, June, 2000

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Volume 4: Everyone a Teacher, Everyone a Learner, 1995, 245 p.

Volume 5: Shared Leadership, Shared Responsibility, 1996, 276 p.

Volume 6: Future Horizons: Recent Literature in Sustainable Agriculture, 1997, 222 p.

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Volume 8: Procedures for Evaluating Alternative Farming Systems: A Case Study for Eastern Nebraska, 310 p.

Volume 9: Facing a Watershed: Managing Profitable and Sustainable Landscapes in the 21st Century, 264 p.

Volume 10: Small Farming Systems for the Midwest, and Reintegrating Agriculture and Community in the Midwest, 166 p.

Volume 11: Urbanization of Rural Landscapes—Syllabus and Teaching Materials from a University Course, 335 p.

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"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

Aldo Leopold



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**Urbanization of Rural Landscapes, Spring Semester 2000, Wed 6-9pm, 234 Keim
AGRO 496 (#1333), AGRO 896 (#1356), AECN 896 (#1177)**

Overview & Course Goals:

Each year more than 1.4 million acres of rural lands are converted to housing, roads, and other development. Far more acres are influenced as development fragments landscapes, speculation drives up land prices, and production agriculture is pushed onto more marginal lands. This process forces changes in agriculture, rural landscapes, and human communities. There are many influences on landscape functions such as agricultural production, water quality, biodiversity, climate, aesthetics, and most of these are negative changes. *Urbanization of Rural Landscapes* is a multi-disciplinary, experiential course that guides students in learning about this process and its impacts. The goals are to build an understanding of the factors that cause urbanization, the impacts on agriculture and society, and the choices that are open to informed citizens.

Learning Objectives: A student or observer who completes this course will be able to

- Describe the patterns and impacts of land conversion, and the major factors that influence land use decisions.
- Access internet and other information resources on land use policy, farmland preservation, and alternative development strategies.
- Demonstrate familiarity with land use planning tools, policies, and procedures, and practice these in a local development scenario.
- Participate in community debates on land use issues and contribute to public understanding of the issues and impacts of urbanization.

Logistics of Course:

Urbanization of Rural Landscapes will meet Wednesday evenings from 6 to 9 pm from January 12 to May 3, 2000. The course will include lecture, small and large group discussions and activities, demonstrations, invited resource people from several disciplines, field trips, and individual and group projects. Each day the class will be structured as follows:

6 - 6:50	Discussion of readings, group activity
7 - 7:50	Invited speaker and discussion of key topic
8 - 8:50	Group activities, decision cases, work on major project

Motivation will be provided through weekly exercises, one book review, midterm and final exams, and individual and group projects. Self-evaluation will be supplemented by peer and faculty review of activities. Auditors from the community bring a rich experience to the course, and we invite them to participate in all activities of interest. Visitors are welcome at any time for specific topics or activities.

References: The text for the course is *Under the Blade: the Conversion of Agricultural Landscapes*, Richard Olson and Thomas Lyson, editors, Westview Press, Boulder, Colorado, 1999. This will be supplemented by articles from the literature and the popular press, current reports on local issues and activities, maps and software on Lincoln, Lancaster County, Nebraska, and the U.S. Students will contribute to this resource base through their book reviews, research on specific topics, and internet searches that will be shared with the class.

Instructors: Charles Francis, 225 Keim (472-1581, office) (483-6727, home)
David Mortensen, 309 Keim, (472-1543, office) (476-0544, home)

Evaluation:	Article reviews (8) = 20 points	Exercises (6) = 20 points
	Midterm exam = 20 points	Final exam = 20 points
	Small group report = 10 points	Large group report = 10 points

Course Schedule and Topics: (with invited resource people in each class)

- January 12 ***Structure & Function of Rural and Urban Landscapes***
6: Introductions, syllabus, course expectations & structure
7: Current landscapes and land use patterns (DM), tools (Larry Cutforth)
8: Gallery walk exercise on landscapes & land use, Class project introduction
Due: Student information page; In-class biography
For next week:
Readings: UB Forward, Preface, Introduction, Chapter 1
Exercise: Review of popular article, Class photo project, Knowledge of place
- January 19 ***Structure & Function of Rural and Urban Landscapes***
6: Discussion of readings & articles, Knowledge of place
7: Structure and function of rural/urban landscapes (Roxanne Smith)
8: Case studies on decisions by farmers, families, business owners, developers
Due: Knowledge of place exercise (E1)
For next week:
Readings: UB Chapter 2 on Landscapes, articles
Exercise: Review of popular article
- January 26 ***Human Motivations and Choices about Urbanization***
6: Discussion of readings & articles, Sense of place exercise
7: Motivations and decisions, the importance of choice (Jamee Dick)
8: Group discussion on sociology of choices, class small project decisions
Due: Article review (A1)
For next week:
Readings: Articles, Resource materials list & list of books (3) for possible review
Exercises: Review of popular article, Small project outline
- February 2 ***Innovative Planning of Urban and Rural Landscapes***
6: Discussion of readings, quiz on landscapes, discussion of quiz
7: Urban and suburban landscapes, structure and function (Cecil Steward)
8: Discussion of urban/suburban landscapes, impacts of decisions
Due: Article review (A2), Written exercise in class -- landscapes, motivations (E2)
For next week:
Readings: UB Chapter 6 on Ethics & Aesthetics, articles
Exercises: Review of popular article, Book review choice & outline
- February 9 ***Ethics and Aesthetics of Planning and Landscapes***
6: Discussion of readings, popular articles
7: Ethics and aesthetics of urban and rural landscapes (Richard Sutton)
8: Discussion of ethics and aesthetics, multiple valuation options
Due: Article review (A3), Book review outline
For next week:
Readings: UB Chapter 5 on Economics, articles
Exercises: Review of key resources on urbanization

- February 16 ***Economics of Urbanization and Landscape Conversion***
 6: Discussion of resource materials, popular articles
 7: Economics of conversion, multiple valuation criteria (Bruce Johnson)
 8: Discussion of economics, decision making
Due: Annotated list of key resources (at least 10 resources) (E3)
 For next week:
Readings: Articles, UB Chapter 3 on Legal Issues
Exercises: Review of popular article, Course evaluation I
- February 23 ***Legal Dimensions of Planning and Land Use***
 6: Discussion of readings, popular articles
 7: Legal issues in planning land use and urbanization (Joe Luther)
 8: Discussion of community and county planning
Due: Article review (A4), Course evaluation I
 For next week:
Readings: Articles, Ecological design criteria
Exercises: Review of popular article, Ecological design exercise
- March 1 ***City and County Planning Process***
 6: Discussion of field trip, readings, popular articles
 7: Lincoln -- Lancaster County Planning Commission (Mike DeKalb)
 8: Discussion of ecological design, preparations for midterm exam
Due: Article review (A5)
 For next week:
Readings: Review all prior readings
Exercises: Summary paper on popular articles (2 pages max)
- March 4 8 to 4: Field trip of Omaha & Lower Platte areas (several resource people)
- March 8 ***Building Consensus in Ecological Planning***
 6: Midterm exam
 7: Building consensus in communities (Kip Hulvershorn)
 8: Discussion on community planning, discuss group processes
Due: Review paper on popular articles (E4)
 For next week:
Readings: UB Chapter 5 on Community agriculture, articles
Exercises: Review of popular article, course evaluation II
- March 15 Spring Break
- March 22 ***Tools for Planning & Visualization***
 6: Discussion of exam results, readings on agriculture, articles
 7: Tools for planning and visualization (Larry Cutforth, Juan Ramirez)
 8: Practical experiences with visualization and planning
Due: Article review (A6), Course evaluation II
 For next week:
Readings: McKibbin Chapter on Curitiba, Brazil
Exercises: Detailed small group project outline

- March 25 8 to 3: Field trip in Lincoln & Lancaster County (several resource people)
- March 29 ***Models for Future Communities***
 6: Discussion of readings on communications
 7: Hard edge zoning versus uncontrolled growth (DM and CF)
 8: Discussion and Group project work
 Due: Article review (A7)
 For next week:
 Readings: Jeavons Chapters
 Exercises: Draft Letter to editor, Preliminary report on small group project
- April 5 ***Farming Near Cities and Urban Agriculture***
 6: Discussion or readings, letters to editor
 7: Community agriculture and farming near cities (Kevin and Charuth Loth)
 8: Discussion of CSAs, direct marketing, farming near cities
 Due: Article review (A8)
 For next week:
 Readings: Articles on local development, case studies
 Exercises: Prepare small group project reports
- April 12 ***Impacting Public Opinion through the Media***
 6: Discussion of readings, articles
 7: Communications and public opinion (Graham Johnson)
 8: Group planning on integrative project, prepare outline and drafts
 Due: Individual project reports
 For next week:
 Readings: Articles on local development, case studies
 Exercises: Revise small group project reports, Revised letter to editor
- April 19 ***Development Decisions in the Community***
 6: Discussion of decision making in Lincoln - Lancaster County
 7: Panel discussion on local development issues (Developer, Planner, Ecologist)
 8: Discussion of local issues, outline and prepare presentation(s)
 Due: Individual project report, Final letter to editor (submit for publication) (E5)
 For next week:
 Exercises: Large group report preparation, Course evaluation III
- April 22 8 - 2: Tour of Development, on Mo-Pac Trail, Barbeque at Francis' house
- April 26 ***Practice Group Presentation for Planning Commission***
 6: Preparations for final report presentation
 7: Practice and presentation
 8: Discussion of final exam, preparations
 Due: Report on Planning Commission or City Council Meeting (E6)
 For next week:
 Readings: Review all course readings and materials for final exam
 Presentation to Planning Commission: To be scheduled
- May 3 ***Final Examination, Course Evaluation IV***
 8:15 - 10:15 pm Final exam, evaluation, discussion

Principles of Planning for Lincoln and Lancaster County

**Reports from University Course Agronomy 496/896
"Urbanization of Rural Landscapes"
Spring Semester, 2000**

**Reports by:
Larry Cutforth, Joel Connot, Juan Ramirez, Ed Trouba, Dan Keller,
Don Jensen, Jan Jensen, and Lynn Darling**

**Executive Summary by:
Charles Francis and David Mortensen
University of Nebraska -- Lincoln
June 16, 2000**

- 1. Executive Summary**
Charles Francis and David Mortensen
- 2. Guiding Principles for Lincoln, NE in the year 2025: Land-use Practices**
Joel Connot and Juan Ramirez
- 3. Open Space and Environmental Quality**
Larry Cutforth and Ed Trouba
- 4. Planning for a Sustainable Future**
Dan Keller, Don Jensen, and Jan Jensen
- 5. Observations and Recommendations on Lincoln Center City Streets**
Jan Jensen and Don Jensen
- 6. Planning for Social Interaction**
Dan Keller, Don Jensen, and Jan Jensen
- 7. Lincoln Area Current and Future Trails Network**
Lincoln-Lancaster County Planning Commission

The city of Lincoln and Lancaster County (Nebraska) are embarked on a renewal of the comprehensive plan for the future. The most recent plan (1994) states that:

Lincoln and Lancaster County are one community which lives together, works together, and plays together. It is a community which cares deeply about the health, safety and welfare of all of its members. It is a community which works rigorously to improve itself and the quality of life for all its members.

There is a great tradition of planning in Lincoln and Lancaster County. The people of the county think and care about the future of the community. Comprehensive planning is an important element in the community's success and a major reason that the community has remained whole.

Within this spirit of community, we offer the results of a class project conducted in Spring 2000 in a course on Urbanization of Rural Landscapes, a project that used Lincoln and the surrounding county as a model to look at alternatives for the future. We studied the principles of planning, the legal and economic dimensions and motivations, and the social dynamics of the local community and its potential for physical growth in the future. Experts from the university, from the private sector, and from city government were brought in to give us background on the history and current demands for growth. Two field trips provided a first-hand look at local development activities and options. Here we summarize the attached reports.

Students underlined the need for growth to be effective, efficient, and sustainable. They insisted that today's decisions should help manage growth in ways that meet short-term needs but do not drastically reduce future options. There was a concern that planning and development need to maximize the use of land, while maintaining flood plains, wetlands, and native woodlands as public space. They recommended compact development, and efficient use of existing infrastructure. The process needs to be guided by ethical, esthetic, and ecologically appropriate perspectives. There should be thoughtful planning beyond an immediate market perspective, and the process should benefit all citizens. Plans should fit the natural landscape, and they should include farmland and greenbelts for preserving the boundary between urban and rural land uses.

Specific attention was given to preservation and use of open space. Excluding development from the 100-year floodplain, maintaining historical sites and cemeteries, and protecting wetlands and saline areas were given high priority. Protective mechanisms suggested were financial incentives, taxation, and zoning. Students recognized the critical importance of public education in the development of any such preservation and use plan.

Longer-term issues included planning for a sustainable future, given the need to preserve natural resources. Specific attention was given to transportation systems based on a public system of bus and light rail that would complement the personal vehicle as well as bicycles and other alternatives. Ring roads were proposed as a way to relieve congestion in the city center. Implementation of the ideas would require taxation, alternative fuels, and education. The importance of social interaction as a consequence of planning and design of city surroundings was emphasized. New urbanism and careful design of neighborhoods was proposed as a method to achieve efficient land use in a sustainable future for Lincoln and Lancaster County.

“Guiding Principles for Lincoln, NE in the year 2025, Regarding Land-use Practices”

Introduction

In a community the size of Lincoln, NE, there is a great need to plan for expected growth in the most effective, efficient and sustainable manner. In the beginning of this country's history, city planning was minimal. The city planning was based on simple logistics and owner's desires. In order for the sustainability of the community to be maintained, citizens need access to all of the community's activities and services. In addition, the city has to be as compact and dense as possible. This is often most feasible in a system that has all types of development mixed together.

The Methods for Shaping Growth

Ordinances and Zoning

Designing the model for future development of a city/county is important and very difficult work. Although we can predict with relative confidence that a city's population will grow by a certain percent/year, we are not completely confident about how the growth will shape our community. There are many factors that could affect land

use practices. Assumptions are made that growth will occur, but the form is impossible to determine. Will the jobs created in the next generation be in the manufacturing, service orientated or professional sectors? As the rate of technology development increases our future becomes even more difficult to predict. Even everyday activities will be even harder to predict. For instance, Bill Gates was unsure about the role of the Internet in the everyday life of the American populous as late as 1994. That was only 6 years ago. The cores of all developments need to be planned in a way to accommodate a wide range of options.

Much consideration must be given to changes in zoning before making any changes to the current zoning. Although at first glance zoning laws appear to waste precious space, it is important to remember the motivations behind the current zoning laws. The current zoning was established to protect certain groups and individuals from activities that might not be considered acceptable for everyone. For instance, placing a bar next to a church might seem like an efficient use of space, but it might not meet the needs of all in a society. It is important not to lose the benefits of zoning that have been enacted over the years in an attempt to gain a little density. Some zoning, may appear wasteful of space, but in the larger picture is necessary to separate components of the community that are in opposing endeavors.

Those who designed the first zoning laws in the nation did not know the future, but they did know one thing. They knew that the people living in the future will know more about the future than they did. Therefore, zoning and other ordinances should be

able to be changed to best fit the use at the times. It is important to be able to modify zoning, ordinances and comprehensive plans to tailor the land use to meet each situation.

Efficient Use of Space

New development for the city should be developed in a way that will maximize the use of the land. The newly developed areas of the city should efficiently use space that is acceptable to develop (environmental sound, etc.) and leave flood plains, wetlands, and native woodlands to be preserved as open space for the entire community to enjoy. When unacceptable developmental areas are excluded it becomes clearer how precious prime agricultural and developable land is. Every effort should be made to curb land use per capita. In the decade between 1982 and 1992 the overall density of the nation decreased from .23 acres per person to the level of .6 acres per person (Olson, 1999). We would like to see the new developments of Lincoln increase its density back to the 1982 levels. There are two ways in which to approach “compact development”.

What does compact development mean? In new construction and development, it means designing and shaping the community to place the maximum amount of residents per area developed. This is accomplished by using smaller lots, more multi-family housing, and reducing the emphasis on car travel to reduce the need for parking. Another way in which to increase density is to “in-fill”. In-fill is the concept of building in areas well inside the city limits that were not used before or having a change in use. This may

involve building a house on a left over or abandoned lot, or converting old industrial areas to residential or other use.

Compact development also provides a more efficient use of economic resources by reducing the need for additional infrastructure. In addition, it also provides an opportunity for more sociological interaction. In economic terms, compact development uses the maximum quantity of preexistent infrastructure (i.e. downtown sewers, pipeline, electric wires, etc), for new development or to provide incentives for to redevelop in older neighborhood areas. In sociological terms, compact development is a means to capture the human capital of the neighborhood. It provides the environment to create relationship and friendship with neighbors and community members. When a environment is created in which people will live long term, they are able to take advantage of the opportunities for social interaction associated with belonging to and taking part in churches, clubs, recreational activities, schools, etc. This community environment will have the ability to generate strong sociological links that can live on for generations. In turn, this community will be sustainable.

Forms of Compact Development

The following is a description of types of development available to the city of Lincoln that would make land use more efficient. There are several types of compact development, which could include clustered single-family homes in the suburbs, higher densities around transit stops in the inner suburbs, or traditional neighborhoods with

mixed uses. Local communities should encourage the following forms of compact development:

1. Cluster development (also known as “open space development” or “conservation development”). The idea is to reduce lot size each in compact clusters for houses. Therefore allowing more open space to preserve natural features such as trees, valleys and steep slopes.
2. Higher density development allows more compact development than clustering. It places a high number of units on the same amount of land through the use of multifamily dwelling units. Higher density communities are more likely to support local neighborhood shopping by creating more walkable communities.
3. Traditional neighborhood developments (TNDs) (also known as Neo-traditional or New Urbanism developments). This kind of development encourages the creation of downtown centers, mixed spaces (housing and commercial uses), open spaces areas, and it encourages non-contaminant transportation vehicles, emphasis is giving to providing plenty of walking and biking areas. This reduces the need for automotive travel inside the development.
4. Transit-oriented developments. The idea is to develop high-density urban areas around transit stops, especially mass transit including light rail and bus transit. Areas farther from the transit zones can have a lower density.
5. Master planned communities / planned unit developments (PUDs). It incorporates one or more types of compact development options, such as townhouses and apartments, attached single-family homes or detached single-family homes. The

idea is to achieve more varied and appealing neighborhoods. This encourages a wide range of homebuyers in the same area giving to them more options.

6. Use development. It allows a multiple land use on the same area, such as offices, commercial, hotel or residential. This will help increase overall density by going back to the original types of development. More types of structures and uses will be allowed in the same area. This should make areas more compact and more efficient and reduce the necessity for the automobile, because all types of goods and services will be within walking distance.

Use of Existing City Infrastructure

Large-scale urban development requires an adequate access to water and sewer facilities. The placement of city infrastructure is essential to both the financial and developmental stability of a community. First of all the construction of sewer and water facilities and transport lines are extremely expensive. And secondly, since they are so expensive to build they determine which areas of the city will develop. Therefore, strategic placement of the infrastructure is essential for limiting sprawl. Consideration should be giving to only build water and sewer lines in areas that meet the proper criteria for development and have been appropriately planned. The reality of this is the fact that infrastructure placement dictates the location of all development. Therefore, it is important to place water, sewer, schools and arterial roads in areas in which development is desired.

Suggested Areas for Expansion of Lincoln

We have divided the city of Lincoln into five sections of different kinds of developments (attached map). The idea has been to try to address the current scenarios of the city in terms of the population density, quality of the soil and land use, and to implement an urban growth plan with the lowest environmental impact for the next 25 years. We have limited the expansion of the city for the next quarter of century to the design of a greenbelt that surrounds the city; protecting the hydrographic system from the agricultural and industrial activities. Then, the greenbelt acts as the natural fence and green lung for the city, which has the function of a filter for the water from the surroundings and to create multifunctional-ecological uses for the people. This plan of development is as follows:

1. East section of the city

1.1 Cluster development. It has been suggested that a moderate dwelling density for this area of the city is the best option because it preserves the agricultural scenario of the current landscape, and it makes a perfect transition zone from the outer area of the greenbelt. This area has to be conceived under a high level of importance, not only in ecological terms, in urban development as well. The price of the land has to be one of the most expensive for the city, because of the natural conditions of the area, and the medium to low housing density.

2. South east section of the city

2.1 Higher density development. Currently, the city of Lincoln has experienced a high sprawl in this area, with infrastructure that has elevated the costs for the citizens. Because the city has invested a large amount of money in this area, a more efficient use of the land in this area has to be addressed to intensify the land use at a higher density of occupation.

3. South West section of the city

3.1 Master planned communities / planned unit developments (PUDs).

It is necessary to provide to the dwellers of the city a major variety of options in terms of urban development. A major variety of supply will allow an increasing demand for new projects of urbanization, thus a more competitive and affordable market might be created for the medium to low-income groups of the city.

Furthermore, a more efficient use of the rural space can be provided since the development of alternatives can be done following ecological principles, rather than the mere speculation of the land price.

4. West section of the city

4.1 Transit oriented developments.

The idea is to utilize the existent network of railroads and highways (i.e. I-80) to the development of the city. This approach allows for a more competitive and efficient use of the infrastructure and serves as an expedite way for displacement for the new dwellers to the new urban locations, such as schools, churches, jobs, etc.

5. North section of the city

5.1 Use development.

It is conceived as a high-density occupation of the land. The criteria are to create incentive for the development of urban design, under a more dense and multifunctional perspective in the suitable areas. In those areas with soils that are known as having low productivity (saline) or saline wetlands no development should occur.

Summary and Conclusions

The implementation of the new urban scenarios for the city of Lincoln has to be addressed from an ethical, aesthetical and logical perspective. The ethics should be addressed because developers and the market force have dictated the expansion, shape, and orientation of the city. The lack of planning means unexpected results for the well being of the citizens and for the ecological scenarios. Therefore, civil participation is essential in the development of strategies for the city. Logical, because the environment

has to deal with the natural laws (i.e. flooding, slope or soil limitations) these limitations cannot be neglected. Aesthetical, because the city should be developed in a way that is appealing to those who live and visit the city.

A suitable city means a place where the current and future citizens can enjoy in a safe way (emotionally, physically) the indemnities of the landscape. Currently, it seems that the city of Lincoln is losing its North, since the urban development has limited ethic and aesthetic consideration for the quality of life of the people and surrounding environment. However, the local participation can work with the developers and create a planning process that assures the city will be able to sustain in the long term and be able to meet the demands of increased population. The combined forces of government, private sector and the community can work together to create plans for sustainable growth that will lower the negative externalities to the environment.

Reference:

Olson, Richard H. 1999. *Under the Blade*, Westview Press p.25

Open space/environmental quality

Larry Cutforth & Ed Trouba

Goals

- Preserve the quality of the environment for future generations.
- Protect open space and ecologically rich sites.
- Maintain current urban open space areas such as parks, cemeteries, and athletic fields.
- Provide adequate land for parks and other open space uses in newly developed areas.
- Seek compatible compromises with home and business sites with open space.
- Avoid fragmentation of natural areas and productive farmland.
- Maintain productive land in farming.
- Bridge the gap between people and their food system.
- Provide a network of trails for experiencing nature and to facilitate movement within the county.

The exclusion of development in the 100-year floodplain, areas with wetlands and saline soils, identified historical sites, and cemeteries is an important step in protecting ecologically sensitive areas in the county. Multiple land use protections tools will need to be implemented to protect these excluded areas and prime farmland in Lancaster County. The following is a list of land protection mechanisms organized under three broad categories: 1) Financial incentives 2) Zoning and 3) Taxation. Recommended actions are then presented for preserving open space land in Lancaster County.

Financial incentives

- 1) **Donated conservation easements** are voluntary legal agreements between a landowner and a land trust or local government agency that allow landowners to permanently limit or prohibit development on their property. Conservation easements run with the title so that all future owners are bound by the original agreement. The benefits of conservation easements are that it is inexpensive for the government to implement, keeps land on the tax rolls, and landowners receive income from the land while protecting it from development. On the negative side, the government does not have control over where development will occur and tax incentives may not provide adequate compensation for landowners.
- 2) **Purchased development rights (PDR)** are voluntary legal agreements that allow owners of land meeting certain criteria to sell the right to develop their property to local government agencies, state government, or to a nonprofit organization. A conservation easement is then placed on the land. This agreement is recorded on the title to permanently limit the future use of the land to agriculture, forestry, or other open space uses. Although PDR is expensive to implement, this mechanism compensates landowners to protect land in target locations.
- 3) **Transferred developments rights (TDR)** are enabled by local ordinances that create sending areas, or preservation areas, and receiving areas where communities encourage additional growth and development. Landowners in the sending area receive development right credits that they can sell in exchange for not developing their land. Real estate developers, speculators, or the local unit of government can

then purchase the development right credits and use them to increase existing or planned densities in receiving areas. The main benefits of TDR are that it uses free market mechanisms to protect land from development in target areas. However, TDR requires a strong real estate market, receiving areas that will accept higher densities, and more complex management.

- 4) **Land acquisition:** is used in select cases when willing landowners want to conserve their land by selling or donating it outright to a public agency or a land conservation organization. This mechanism allows the public agency to have full control over a property's future. Land acquisition is expensive and removes land from the tax rolls, but gives the government control over the location and management of protected land.

Zoning

- 1) **Cluster/open space zoning** is an ordinance that allows or mandates the grouping of dwellings on a part of the property while restricting development on the remainder of the property. The land is typically protected through a conservation easement. Density bonus incentives may be given. The benefits of this alternative are that landowners may protect land, reduce infrastructure costs, and profit from developed land. However, this type of zoning does not necessarily direct growth adjacent to the city and may result in pockets of development in largely rural areas. The Loths used a similar method to preserve open space near Lincoln under a community unit development. Higher bonuses than the existing 20% for cluster development and open space preservation in planned unit developments may also encourage more widespread cluster development. in the county.
- 2) **Exclusive use zoning** restricts uses in a given area to those associated with farming or other resource base uses. Residential and commercial development not associated with farming or other uses is usually prohibited. Although exclusive use zoning may protect large areas of land, it may be considered overly restrictive. Undeveloped portions may be developed if ordinances change without the protection of a conservation easement.
- 3) **Large minimum lot size zoning** is a zoning district that is intended to promote agricultural land protection. Large areas of land may be protected through this mechanism with low administration costs. However, undeveloped portions may be subdivided and developed without the protection of a conservation easement. The 1000 Friends of Minnesota recommend that the minimum lot size be larger than 80 acres to limit acreage development. Perhaps, 40 acres would be adequate in the Lincoln area. However, a large minimum lot size requirement may be considered overly restrictive to some landowners.
- 4) **Natural resource protection overlay districts** are zoning districts that overlay other zoning districts and contain provisions for the protection of natural resources. This zoning mechanism would help avoid placing buildings on sensitive, unstable, or

hazardous areas. Again, the land may be subdivided in the future if ordinances change unless conservation easements restrict undeveloped land.

- 5) **Fixed area-based zoning** is when the allowed number of dwellings is fixed based on the size of a parcel. The dwellings must be located on small lots within the large parcel. For example, one dwelling for every 40 acres in a parcel to be located on a building on a building lot of up to 2 acres. The landowner is allowed to develop some land while maintaining farmland and open space. However, fixed area based zoning may encourage rural residential development.
- 6) **Sliding scale zoning** occurs when the number of dwellings per area decreases as the size of the parcel increases. Smaller parcels not viable for farming are developed at a higher overall density than large farm parcels. Similar to fixed area based zoning, large parcels of farm and open space land may be conserved while allowing for some development. Undeveloped land needs to be protected with conservation easements. On the negative side, small parcels may be developed across the county and fragment the landscape.

Taxation

Differential Taxation: Tax assessment based on land usage. Presently, rural landowners in Lancaster County may enroll their land in the greenbelt program to receive a lower tax assessment for agricultural use. If the land is changed, a three-year rollback of property taxes is assessed at the new land use rate.

Prime farmland tax: Assessed property taxes will be 3% higher than the original assessment on areas classified as prime farmland to discourage development in these areas. Similar taxes could be used to discourage development in unprotected floodplains and ecologically sensitive areas.

Distance from urban center tax: Following Don Jansen's idea, new development is taxed based on its distance from downtown. Tax breaks for in-fill development may be an alternative to the distance tax.

Discussion:

These mechanisms for open space protection are widely known by the planning community. Some of these options have already been implemented in Lancaster County on a limited basis. Although a bonus for cluster development is available to developers, most of the zoning options described above have not been used in the county. The challenge is how to pay for open space protection. The next section describes some general approaches to fund financial incentive alternatives.

How to pay for open space protection?

Funding through private donors, local agencies, conservation groups, foundations and other sources are available for land protection funding. Some options for public financing of open space protection include:

- Fund from development or impact fees as an alternative to land dedication by developers.
- Tax revenue (property tax, excise tax –Pennsylvania funds a transfer of development rights program through a cigarette tax)
- General obligation bond: communities bond to pay for open space and pay back the interest and principal on the bond from user fees, taxes, or the general fund. It sometimes requires voter approval.
- Revenue bond: tax is levied for a specific project.
- Other funding mechanisms include deed transfer taxes, mortgage registry taxes, and lottery proceeds.
- Matching funds through state and federal programs exist for wetland protection and other conservation measures.

Recommended actions

Although many mechanisms exist to preserve open space, farmland will not be preserved without supporting viable local agriculture production. Agriculture systems on the fringe of the city need to develop more profitable enterprises than standard corn and soybean cropping systems. Some local market gardeners have developed financially successful operations through exploiting a niche for fresh produce. Urban consumers need to learn more about their food systems and the impacts of their actions to preserve these areas.

The financial incentive alternatives are probably the most desirable because they protect land over the long term without raising taxes or restrictive zoning. Zoning that encourages cluster development and natural resource protection in sensitive areas would also be helpful. Although taxation is unpopular, a tax on prime farmland may provide an economic incentive not to develop productive agricultural land in the Lincoln area. Wetlands, floodplains, historical sites, and other ecologically sensitive areas would initially require the primary focus of open space protection programs in Lancaster County (see attached map from the overlay analysis).

Gaining support for open space protection

The implementation of open space protection in the areas identified above would require sustained public and political support. As a starting point, Lincoln residents need to learn more about why these areas are important to preserve, the impacts of growth, and alternatives for development in the future. The county planning department seems too reactive to initiate a change of course from current practice. Therefore, leadership for these advocacy efforts will probably need to originate from community groups. The development of a local non-profit such as 1000 Friends of Minnesota or the Urban Open Space Foundation in Wisconsin would help better organize people to support open space protection in the area. As a first step, a public survey may help gauge the level of support for open space protection. Overall, community groups need to catalyze broader public support for open space protection to influence the political process of development in Lancaster County.

Planning For A Sustainable Future

A look to the future is necessary when decisions are made that concern the use and consumption of non-renewable resources. The following are some ideas that may provide some insight for decision makers.

One area that has the potential to spread future growth economically throughout the county is the development of a network of bus routes. These routes could be used to bring commuters into the city from the outlying areas of the county, and possibly neighboring counties. With this system in place we can reduce traffic, air pollution, city resources, and strain on areas near city development. This saves agricultural resources near the city from development while creating economic help for small towns.

Along with these commuter bus feeder lines needs to be the coordination of city service to make the connection to work and educational centers a smooth one. Connection points could be at shopping centers, donut shops, or coffee houses equipped with Internet connections so the passengers could relax, work, or spend money and not feel like they were waiting for a bus. After use on commuter routes, the extra busses can be used to further enhance scheduling in the city.

An additional set of improvements that would make this system more effective would be the creation of a better network of bike trails and corridors connecting the bus connections with the destinations of the passengers. By making it possible for bikers to take their bikes along with them on the busses, we can let them make the entire circuit from home to destination and back with no inconvenience. This system will make a significant decrease in the growth of traffic in the city of the future. Bike routes should be made throughout the city with transportation, not recreation in mind. The more bikers we can get off the streets, the better off we all will be :)

Similar connections could be used on the Lincoln/Omaha ends of a light rail commuter, or bus line. If the other ingredients are in place, the flow of commuters on a rail/bus line from Omaha could be absorbed into the system with a minimum of stress.

A series of ring roads needs to be built/maintained to make it possible for traffic to avoid the downtown area if that is not their destination. The downtown would benefit by reduced through traffic and easier parking, as well as reduced air and noise pollution.

Traffic and Roads Inside the city of Lincoln

It is presumed that the parkways on the south and east of the city will be completed early in the year 2020. It is also assumed that the major roads leading to the city center planned as part of the Antelope Creek Project will be completed during this time period. It is also assumed that the personal auto will continue to be the major method of personal transport used by the citizens.

There are three kinds of improved city roads (i.e. roads improved beyond two traffic lanes in opposite directions).

- 1) 2+CTL, or two-traffic lanes plus a center turn lane.
- 2) One-way pairs.
- 3) Major four to six lane arterials.

A number of low-cost actions should be made to increase traffic flow along these three different kinds of roads. These actions include:

- 1) Increasing the number of 2+CTL roads so that all arterials are improved at least to 2+CTL status.
- 2) Increasing the number of one-way pairs.
- 3) Increasing the number of four to six lane arterials in the developing suburbs. Adequate right-of-way for ample green space, bicycle trails, and wide medians should be attained prior to the initial construction phase.
- 4) Integrate current roads into better functioning systems. These provide routes which circumnavigate the city without going through the city center within which traffic moves more slowly.

5) Improve use of the one-way pairs, especially downtown. One-way pairs have a major advantage over four to six lane major arterials; they make unnecessary special left-turn light cycles and are consequently more efficient than large, complex intersections between crossing four to six lane arterials.

In recent years, decisions have been made to change well-functioning one-way pairs to two-way streets with consequences which have ranged from the unfortunate to the catastrophic. These decisions should be reversed to encourage effective and safe traffic flow downtown.

The Antelope Valley Draft Single Package, as of April 10, 2000, calls for construction of a four to six lane roadway from the intersection of the railroad and 17th Street south to K and I Streets. That plan would interfere greatly with the smooth flow of traffic downtown, bifurcating the downtown commercial area to East and West of this roadway, and discouraging vehicular and pedestrian movement between the East Downtown and the West Downtown areas.

This five to six lane roadway should be replaced by a one-way pair south of R Street so that O Street would be crossed with a new one-way pair rather than a five to six lane roadway.

The last paragraph introduces the topic of what should not be done in the period until 2020. First, no four laning of 2+CTL roads should occur. It would be far less destructive to the inner city neighborhoods to add additional 2+CTL arterials than to widen four lane existing arterials. An overpass constructed over numerous portions of Antelope Park could make Van Dorn an effective E-W route without destroying neighborhoods. No traffic calming measures should be allowed along arterials in order to divert traffic to other arterials (as is currently planned for Holdredge Street).

Traffic and taxes are the costs of civilization and municipal citizenship, and these costs are best borne if they are widely distributed rather than concentrated on the unfortunate.

Finally, improvements in traffic signals and sign systems should be employed. "Smart" lights which modify traffic light timing so that waiting at lights is minimized should be much more widely utilized and Lincoln should be "state-of-the-art" in traffic management by "smart" sights.

It should be recognized that traffic flow and speed is unplanned by road character (width and smoothness) and by traffic signals, and that in almost all cases substantial delays occur because of traffic signals rather than traffic back-up or interference.

If the measures described are employed, traffic inside the should move at moderate speeds even during rush hours and traffic congestion should be, as it is now, a minor problem of our city.

Taxation

By 2020 taxation laws and practices should be revised to discourage urban sprawl. Specifically, all properties within the city limits should be taxed three different ways, simultaneously.

- 1) by assessment or value
- 2) by footprint or lot size or acreage
- 3) by distance from the city center

The triple tax would ensure that properties which require expensive city services because they are further from the city center and/or because they produce less dense settlement will pay more taxes than similar properties near the city center and/or on smaller lots.

Recycling/Alternative Fuels

Other ways to provide a more bountiful reserve of natural resources for future generations are more proactive recycling and use of alternative fuel sources.

Recycling of tires and plastics could be enhanced by the creation of a collaboration between the city and the installers of "field turf". If we could make an application of technology similar to that used currently used on athletic fields plausible and cost effective for home owners, we could not only reduce the amount of tires and plastic going to the landfill, we could also reduce grass clippings in the waste stream. An even more powerful saving would be in the chemical use that could be reduced by having lawns made of field turf. This not only saves the

Dan Keller
Don Jensen
Jan Jensen

feet of our children, pets, and mailmen/women from chemical exposure, but also reduces pollution of our ground water.

The wind generators north of town are an excellent example of use of a renewable resource. If we could make a similar mini version using wind/solar power feasible for the rural areas it would be another step toward utilization of more renewable resources. These rural units would provide the electricity for the landowner and the excess generated could be added into the system to reduce costs of future power plants. Some sort of cost sharing arrangement of set up costs between the city/county and the landowner could be utilized in return for the excess electricity produced being put back into the system. Using this system the city could avoid purchasing expensive electricity, especially on hot, sunny, and windy summer days.

Observations and Recommendations on Lincoln Center City Streets

Observations

The consultants' report from the Congestion Management Task Force report clearly demonstrated, using data from Lincoln sources and studies done by their teams, that "traffic congestion on the six study streets is minor to non-existent at the present time" and that "major widening of the study streets is not needed at this time, nor appear to be needed in the foreseeable future." This was welcome news, but it still leaves open the possibility that widening in the center of the city will be considered sometime in the future. It is clear that widening of the central arterials would not only be severely damaging to the central neighborhoods, but also would not significantly improve traffic flow or average speeds. This view is supported by data from several studies, including the CMTF consultant's report.

The peripheral arterials. It must be recognized that there is a difference between widening a street in an already established neighborhood and adding a wide arterial in an area that is being developed. Old Cheney, 70th, and 84th, for example, are arterials that were built as Lincoln expanded. They began with adequate right of way for multiple lanes, so that houses are not only set back from the street, but also usually face away from the street, with driveways exiting onto other streets, rather than directly on the arterial. They have a different pattern of use than the central arterials, with fewer intersections and signal lights and few pedestrian crossings, so they therefore can, and do, have higher posted speed limits.

The central arterials. We cannot go back in time and remake the central arterials to match that pattern. The arterials in the center city are closely lined with houses with multiple driveways and entering side streets and pedestrians. Many Lincoln drivers have the mistaken idea that traffic could move rapidly through the center of the city if only the streets were widened like those on the periphery. Instead, the reality is that traffic through the grid network of central Lincoln with its signal lights, intersections, and driveways can never be high-speed.

South 48th Street, for example, just between "O" Street and Normal Blvd, has 6 signalized intersections with major cross streets, 12 other cross streets, 4 entering streets, 3 signalized school crossings, and 159 driveways (129 residential, 25 commercial, and 5 school and hospital). These obstacles will always prevent rapid traffic movement, no matter how wide the street. We must accept a slower pace through the center, and look to the more peripheral streets if we wish to cover greater distances more quickly.

The grid system. The central arterials are an important part of the grid, or network, of streets which serves the center of Lincoln, and which functions as a system, so that changes in one street affect traffic flow elsewhere. Modifications to individual streets must be done with careful consideration of system consequences, and problems with individual streets or routes may well be alleviated by changes in other parts of the grid. The solutions to improving traffic flow in the six corridors can be found by examining the operation of the whole street system and studying ways to make it even more effective. Recommendations therefore include distributing traffic in the center of the city and diverting through traffic around the center.

Policies and Recommendations

1. First, we need a clear and shared vision for the future of the center of our city. Many cities have irretrievably lost their central residential areas to advancing concrete, replacing attractive neighborhoods with commercial strips and decaying houses beside multiple lanes of traffic. Lincoln is fortunate to still have its well maintained attractive central residential areas. Our vision is to maintain, at all costs, the pleasant residential quality of the remaining central neighborhoods throughout Lincoln and to improve those areas whenever possible. This means tree-lined streets on which trees are replanted rather than simply removed, buried utility lines, more green grass than concrete, streets no wider than can easily be crossed by school children and senior citizens, encouragement of owner habitation, neighborhood parks, etc. Our collective quality of life is heavily determined by the quality of our residential areas.

2. Concern with the streets has focussed on trying to change the streets to accommodate expected traffic. The time has come to make whatever minor non-destructive modifications we can in the central arterials, then accept them as they are (and the data from the CMTF consultants study indicates that they are working remarkably effectively), and turn our attention to changing the traffic to match the streets, through diversion and distribution of traffic.

Methods which divert through traffic around the center city:

- a. Primary among these methods is the further development of the "rapid routes" or "ring routes" providing more rapid transit around rather than through central Lincoln. The arterials for these routes are already in place, many are already four-laned (or scheduled for four-laning soon) and are already posted for higher speeds (e.g., 70th and 84th to the east; Pioneers, Hwy 2, and Old Cheney Road to the south, the West Bypass/I-80 and 9th/10th/I-180 to the west; Cornhusker, Superior, and I-80 to the north). Lincoln drivers are familiar with these arterials for fast east/west or north/south driving, but cannot always move easily from one to another. Improving the connections at the intersections (or "corners") of these already existing arterials (for example, the intersections of Old Cheney with 84th, 70th, 14th, and the West Bypass) will provide drivers with several alternate routes, depending on their destination. Flow on the rapid routes should be facilitated by signing, turn lanes, appropriate signal timing, and a public information campaign to alert drivers to these routes. An immediate and intensive study of ways to connect and designate these multiple routes around the center city could bring considerable improvement to the traffic patterns with relatively low expense, especially since they would be combined with the already existing plans for improvements on several of these arterials.
- b. Prompt development and construction of the south and east bypasses. Further delay in the planning of these important routes will only result in more obstacles being placed in their ultimate path, as new housing developments and recreational areas are springing up with great rapidity in the projected right-of-way.
- c. Designation of truck routes around the center of the city to limit use of central Lincoln streets by through truck traffic, which slows other traffic and damages streets. Peripheral routes that have higher speed limits and fewer access points should make them attractive to truckers.

Methods to distribute traffic within the center of the city:
Effective use should be made of all existing streets and arterials to facilitate traffic flow in and out of the central residential areas. However, changes should be made only following studies which show 1) that change is needed, 2) that change will bring significant improvement in traffic flow in the system, and 3) that changes can be made without adversely affecting the adjoining neighborhoods.

- a. striping of 2-plus (two lanes with center turn lane) streets where feasible without undue damage to neighborhoods. The center turn lane provides a safety factor by separating the two driving lanes, permits more rapid movement of emergency vehicles, allows traffic to move safely around obstacles, such as stalled vehicles, lets traffic flow easily around turning vehicles, is safer to cross for school children and other pedestrians, and provides additional capacity at slight cost, both environmental and budgetary. However, the slight traffic improvement resulting from this change is not worth any significant damage to the neighborhoods resulting from widening to meet 32' width requirements.
- b. identification of underutilized arterials and employment of methods to achieve a balance of usage of the arterials within the central grid
- c. removal of street parking where appropriate on arterials
- d. designating as new arterials streets near and parallel to congested arterials to provide additional capacity.
- e. continuing to update the signalization systems ("smart" lights, coordination, regular review and revision, etc.).

Traffic in the future. While it is very likely that traffic will increase in 20 years, we have no way of predicting accurately where that traffic increase will be or the size of the increase. The addition of new shopping areas, new housing developments, and new centers for recreation, industry, etc. constantly changes and redirects the traffic flow in Lincoln.

The dire predictions of heavily congested streets have been made in the past and have not occurred. We can see to it that they never occur, not by widening streets and destroying the heart of our city, but by sensible management of our inner streets, diverting and distributing traffic across Lincoln's excellent grid system of streets, and by developing our peripheral traffic routes with a system of ring routes and major bypasses around the center of the city.

Major street construction to meet imagined needs in the future can irretrievably damage the center of the city for little or no gain. What should be done is to make nondestructive modifications, and establish principles and policies to guide intelligent action in the future.

Antelope Valley Study. The proposed construction in the AVS has the potential of improving some traffic flow through the center city, but must not accomplish that at the cost of impeding cross traffic and ready access. Arterials and cross streets must be left open whenever possible and six-lane roadways and massive intersections avoided to facilitate easy traffic movement.

J.K. & D.D.Jensen

March 1999 [Updated from June 1996, June 1998]

Planning For Social Interaction

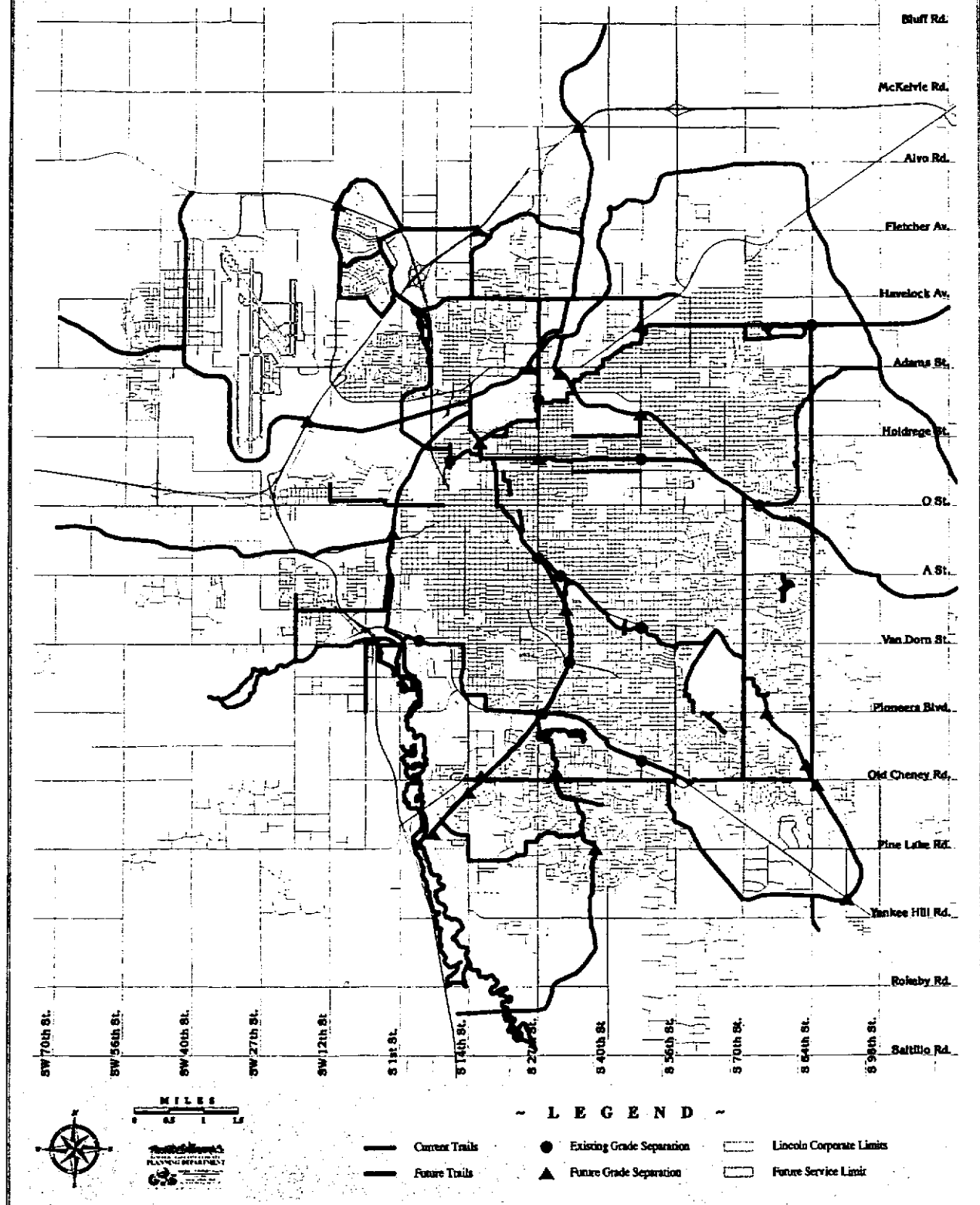
The interaction of people with other people and with their surroundings is a part of the vision for the future of the city. By designing neighborhoods with this purpose in mind, we can enrich life in the city.

New Urbanism is the neighborhood design of choice. With the fronts of the homes facing, and closer to, each other, this design creates an atmosphere of neighborliness. Narrower streets and smaller setbacks allow for slower traffic and more community interaction. While the streets are safer for the children of the neighborhood, they also use a modified grid pattern to move traffic through the neighborhoods without adding extra volume on the arterials.

In this neighborhood setting, the use of public open space for social interaction is an enhancing feature. Local mini parks also serve as trail heads for the cities walking and biker paths. These public areas could be created using clustering of housing and consolidating the open space. They could be owned and maintained by a local community homeowners association, thus furthering the local ties in these relationships.

The city center is another important feature to be maintained and enhanced. The use of ring roads to reduce traffic congestion and ease parking will help recreate the downtown area as a vital link in a healthy city. With bus routes to outlying areas and connections with biker trails, businesses could remain/relocate downtown without the burden of finding parking and dealing with heavy traffic.

LINCOLN AREA CURRENT AND FUTURE TRAILS NETWORK



From: Lincoln-Lancaster County Planning Commission, 2000

Recommended Amendments to the 1994 Lincoln City – Lancaster County Comprehensive Plan for Guiding City & County Growth toward Sustainable Development

Prepared for Course in: *Urbanization of Rural Landscapes*, APRIL 28, 1999

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INTRODUCTION

The objective of this project and report was to analyze and propose changes to the content and use of the 1994 Lincoln City – Lancaster County Comprehensive Plan in order to improve its effectiveness as a mechanism for increasing the sustainability of the City of Lincoln and Lancaster County, Nebraska.

The project analyzed the current 1994 Lincoln City – Lancaster County Comprehensive Plan document in terms of the sustainability of the plan and changes that would increase the sustainability of Lincoln and Lancaster County. Our evaluation process began with discussions and assessment of the current pressures of growth facing the city and the county. It also included the adoption of a standard definition of sustainability that could be applied to Lincoln and Lancaster County.

Each section of the comprehensive plan was then assigned to one project member. Each was responsible for becoming familiar with the content and structure of that particular section, and developing recommendations for changes to the section that would guide Lincoln City – Lancaster County toward sustainability.

This report first briefly explains what a comprehensive plan is and defines sustainability. Next, each section of the 1994 Lincoln City – Lancaster County Comprehensive Plan is evaluated, followed by recommendations for considering and implementing our findings.

THE COMPREHENSIVE PLAN

The comprehensive plan is a document developed by a community to serve as a guide for the future development of that community. It becomes the template for zoning and subdivision regulations for the community. It is not, as many people believe, a law. The elected officials of the community adopt it as a resolution.

SUSTAINABLE DEVELOPMENT

The term “sustainable development” has become popular in the last couple of decades. The Brundtland Commission defined sustainable development as “that which meets the needs of the present without compromising the ability of future generations to meet their own needs”.¹ A more comprehensive definition of sustainable development was provided by the National Commission on the Environment. They defined it as “a strategy for improving the quality of life while preserving the environmental potential for the future, of living off interest rather than consuming natural capital. Sustainable development mandates that the present generation must not narrow the choices of future generations but must strive to expand them by passing on an environment and an accumulation of resources that will allow its children to live at least as well as, and preferably better than, people today. Sustainable development is premised on living within the Earth’s means (National Commission on the Environment 1993, p.2)”²

CHAPTER II – GENERAL CONDITION AND ANALYSIS OF THE COMMUNITY

Chapter II has no direct connections to the planning aspect of the Comprehensive Plan. It describes the contents, conditions and analysis of the community. We believe that there are many ways in which this chapter should be modified to more clearly contribute to the Comprehensive Plan and its processes. Sustainability is important to any living community; therefore, the entire Comprehensive Plan should be written with a strong foundation of sustainability at its core. Our recommendations to Chapter II reflect both of the above stated ideologies.

It is the goal of this project to redirect the Comprehensive Plan towards a more sustainable focus. Therefore, we believe a definition of sustainability should be adopted by the Comprehensive Plan and taken to heart by the planning commission. Chapter II is the first solid chapter of the Comprehensive Plan that may make it an appropriate place to include this definition. Perhaps it would be more useful to include a single page, independent of a chapter, devoted to sustainability as a mission statement for the Comprehensive Plan.

The concept of a community’s ecological footprint is making its way into the world of planning. A footprint is a statistical tool that can be used to determine how much and what resources a community uses. The Lincoln City, Lancaster County Comprehensive Plan should utilize this tool in its planning process as a way to measure sustainability. An initial analysis of the community should be done and then added to the 2000 Comprehensive Plan, if possible. Every year the data can be updated to better gauge the process of the city and surrounding areas. Chapter II is the perfect place to include the footprint analysis.

The footprint analysis must be approached with the right philosophy. It can be a very effective step in reaching goals of sustainability if used properly. Chapter II already has many graphs and charts. It is our criticism that there is little to connect the quantitative data to

qualitative applications in planning. It is alarming what some of the numbers tell us about the growth of the community. Without clear explanations as to what the data imply, the pressing issues of sprawl, population growth and land use are easily overlooked. The language of the chapter seems to encourage, or at least portray in a positive light, unchecked growth and expansion. This underlying trend in the chapter needs to be addressed, and language with the goal of sustainability in mind needs to be adopted.

Finally, education of the public needs to be incorporated into the Comprehensive Plan. It is important for the public to have input into the process and the decisions of the plan. For the document to be truly accessible to the public, certain modifications can be made. These can be better dealt with in subsequent chapters but the tracking of such outreach can be included in the condition and analysis of the community chapter.

Clearly, the present document can be improved in many areas, especially when sustainability is a key goal of planning. By changing the way we look at what the Comprehensive Plan does, we can begin to move towards a better plan. A Comprehensive Plan should be what it implies--comprehensive. This can be accomplished by keeping the public involved and informed. Now and in the future, it is communities that can prove themselves to be sustainable that will thrive. To thrive does not necessarily mean continued growth and consumption of goods.

CHAPTER III - FUTURE NEEDS AND LAND USE PLAN

"A well crafted Comprehensive Plan should foresee where and how the community is changing, as well as be responsive to change as it occurs during the life of the Plan. This section examines a number of demographic, economic and lifestyle changes . . . envisioned to take place in the community over the next two decades and more"³ and foresee how those changes should, or are likely to, impact the need for and use of land in Lincoln and Lancaster County.

The Plan states that "neighborhoods are one of Lincoln's great strengths and their conservation is fundamental to this plan."⁴

Under "Environmental Preservation and Sustainable Growth" the Plan notes that "land use policies will encourage development which conserves resources for future generations"⁵, a definition of sustainability much akin to that adopted in this report. After stating this, the Plan then goes on to say "the basic planning unit suggested by this plan . . . is the natural drainage basins and sub-basins of Salt Creek."⁶

The Plan then focuses neither on "neighborhoods" nor on "drainage basins and sub-basins of Salt Creek", but rather on broad classifications of land use: (1) Urban Residential, (2) Low Density Residential, (3) Commercial, (4) Industrial, (5) Parks and Open Space, (6) Public and Semi-Public, (7) Wetland and Water Bodies, (8) Natural Environmentally Sensitive Areas, (9) Agricultural Land and (10) Other Incorporated Places.

We recommend that the Plan state and implement instead the following: "The basic planning unit suggested by this plan is the neighborhood unit. Future developments will be planned in terms of standards designed to achieve sustainable use of natural and cultural resources."⁷ Where there is no defined neighborhood as yet, a subdivision name would be a practical identification.

A cursory survey of city maps suggests that most functioning neighborhoods have an area of approximately ¼ Section.

At present the Plan identifies Neighborhood Areas by number as in Figure 18. While numbers may be useful for digital record keeping and analysis, neighborhoods assume a far more human dimension if, for planning purposes, they are identified by name. It is recommended that,

for starters, the Plan use the names adopted by Neighborhood Organizations as shown on the map of that name in the telephone book for Lincoln.

Neighborhoods may be industrial and commercial as well as residential, with neighbors including the representatives of institutions located in them as well as residents. Planning for individual neighborhoods should be based on the principles and standards enunciated under Goals and Strategies in Chapter III of the Comprehensive Plan.

However, the city and the county should support neighborhood planning by encouraging involvement of the neighbors themselves, probably through Neighborhood Organizations. In accordance with observations made by Ian McHarg in "To Heal the Earth", (Island Press, P.141, 1998), members of the city/county planning staff should serve as catalysts and resources. To achieve fundamental buy-in and commitment, real neighborhood planning should be done by the neighbors themselves.

Standard specifications for a neighborhood should tend toward sustainability, toward efficient use of resources and conservation of capital. Given below is a compilation of such standards, as gleaned from the existing Comprehensive Plan, from presentations given by planning consultants, from acquaintance with practices in other cities and from personal attempts to define specific sustainability indicators.

High Density Residential Areas with Centrally Located Amenities

One current problem is that infrastructure and services are dispersed, and people must drive long distances to meet their needs and conduct daily activities. Amenities should be located so as to maximize the need for and promote public transportation and provide a community focus within each neighborhood. Elementary schools should be located so that students live within a mile and a half radius. A park/open space should be centrally located in each neighborhood. Neighborhood commercial centers should be centrally located to minimize the need to use vehicles to satisfy common retail needs.

Resources are conserved through clustering of residences. Neighborhoods having service capacities adequate to accommodate a higher density of residents and clustered residences should be identified. They should be designated as receiving areas in a system of transferable development rights (TDR's) established to conserve areas of unusual value to the community for natural/cultural/historical reasons. The natural/cultural/historical landmarks within each neighborhood should be identified and plans developed for their conservation and enjoyment, including provision for accessibility and parking where necessary.

Transportation

Vehicle traffic should be minimized through provision of a safe walkway/bikeway system within all neighborhoods, between neighborhoods, and with access to other parts of the city. These should connect with neighborhood amenities such as schools, parks, libraries, etc. They should also connect with adjacent neighborhoods and, through them, with the entire city.

Street systems in neighborhoods should eliminate through-traffic; thoroughfares should be used only to connect the neighborhood to the community in general. Routes for public transportation should run along thoroughfares connecting neighborhoods and the rest of the community. Stops should be established at nodal points that would service adjacent neighborhoods.

Economic Factors Contributing to Sustainability

Residents of a healthy neighborhood should represent a range of incomes. Tax revenues from residents of greater wealth and residences of higher value serve to make desirable amenities more affordable.

A municipal bond program should be established for financing of neighborhood improvements that will result in achievement of goals for neighborhoods, such as securing a range of incomes in the neighborhood.

Tax revenues realized on increased values resulting from subsidized bond issue financing should be used to retire bond issues and to finance improvements in the neighborhood and the community.

Like institutions of private enterprise, public amenities demanded by citizens of a vital, sustainable community are also subject to the laws of economics. For example, a city the size of Lincoln can probably support no more than one Lied Center. The scale economics of public amenities should be determined. The Plan should envision their location in neighborhoods in accordance with both the capacity of the neighborhood to physically support them (e.g., in terms of minimally congestive transportation) and the capacity of the neighborhood or region to provide the necessary economic support. In this scheme of things, a "downtown" also qualifies as a neighborhood.

Chapter IV - TRANSPORTATION

The Lincoln City – Lancaster County Comprehensive Plan already uses words and ideas that support sustainability in its transportation section. In some areas, the language could be strengthened to increase the focus on sustainability. The philosophy presented is one concerned with sustainability and how to reach that goal. New development receives major attention; however, there is an emphasis on maintaining what already exists and limiting the amount of new construction. A more important need is to create a political atmosphere that supports the plan more directly and completely.

For the evaluation, we used the following basic definition of sustainability: development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Using the existing document and this definition, we found a few areas of the transportation section that need some improvement.

The automobile is not a sustainable form of transportation because it uses a non-renewable source of fuel. In a city, the volume of traffic magnifies the challenge. The need for new construction and road repair is great and the contribution to pollution is increased.

As Lincoln continues to grow it is ever more important that alternative and public forms of transportation be developed. Trails, bike paths, and bus routes are the main areas to develop. Another necessary aspect of this change is education. The individual automobile is ingrained in our society so it will take direct work to shift use to other forms of transportation. It would be especially appropriate to target youth, students, and senior citizens in such a campaign.

Trails and bike paths need to become as important in the transportation area as they are in the recreation area. Future development needs to include a planned system of trails and bike paths that are convenient and useful. Automobile traffic could be decreased and thus reduce the pressure to expand neighborhood streets at the cost of the neighborhood.

Public transportation must be a main focus. Its use needs to be an intelligent and convenient choice if it is to become a viable option. The aforementioned education program should address this situation and work to alter people's attitudes about transportation. Lincoln needs to provide more extensive service -- increased routes and times -- and make schedules more accessible. The city should be prepared to subsidize the program until a sufficient demand is established to create a self-supporting system.

Transportation attracts a high level of public interest. It also influences development patterns. These facts should not be forgotten in the planning process. Sufficient studies

reflecting these facts need to be performed and citizen involvement solicited before major decisions are made.

CHAPTER V - PUBLIC UTILITIES

Public utilities have a major impact on the sustainability of a community and the region. Commitment to planning for a sustainable community means changes now to policies in the Comprehensive Plan. Three areas noted below can immediately impact the goal of a sustainable community.

Lincoln Water System

The City of Lincoln receives its water supply from well fields near the Platte River at Ashland and in Antelope Valley. This water supply is distant from the end users and is vulnerable to use claims from other users such as the Metropolitan Utilities District of Omaha.

1. Encourage developers to utilize natural or less water-dependent plantings in common green spaces as well as residential and commercial areas. Reduce the developers' assessments for water supply infrastructure or credit the developer for such plantings when they are made. A change to less water-intense ground cover will reduce Lincoln water requirements and will reduce the amount of yard waste generated.
2. Establish a tiered water delivery charge for residential customers to recover more of the system costs from larger users (e.g. golf courses) and to encourage conservation of a valuable resource.
3. Develop water supply and water conservation education programs, from elementary grades through adult, to encourage wise use of this essential resource.

Storm Water Management and Flood Control

Flood control in developed areas often requires extensive and expensive engineered systems. Floodplains offer opportunities for the Planning Commission and developers to utilize design and natural landscape features to minimize flooding the cost of infrastructure

1. Prohibit residential, commercial and industrial development in the one hundred-year flood plain. Flood plain landscape is more valuable to a sustainable community for flood control and ground water recharge than for development.
2. Encourage land uses that conform to the natural landscape rather than those that level the natural features and start over.
3. Encourage coordination of efforts to provide green spaces, trails, parks and common areas with the need for control of run off. The City will experience lower capital investment in artificial storm water control measures, the developer will pay less for extension of this service and residents of the area will benefit from these additions to their neighborhood.
4. Stringently control run off during construction to limit erosion and pollution.
5. Encourage designs that minimize impervious land coverings that increase run off, including buildings, parking lots, and excessively wide streets.

Lincoln Electric System (LES)

The Lincoln Electric System is one of the energy suppliers in the Lincoln/Lancaster area. Energy (electricity, natural gas) is relatively cheap at present, but sustainability requires a transition from non-renewable to renewable energy sources such as wind, solar or hydro. Higher energy costs or government policy will move society toward renewable energy sources.

1. Education, from elementary school to adult awareness, is an absolute necessity to change the long-term energy awareness of a community.

2. Federal, state and local governments must formulate clear policies that state a commitment to renewable energy sources to support sustainability. Individual tax credits for ecological design and construction, research and development funding for renewable energy sources, and economic incentives for industries that market or utilize renewable energy sources are tools for implementation of the policy.

CHAPTER VI – COMMUNITY FACILITIES

If the Lincoln-Lancaster County Plan is to set a goal of sustainability, our human dependence on the health of natural systems must become common knowledge. There must be awareness of the ways ecological systems work, knowledge of what happens when their limits are violated, and respect for the services nature provides. Understanding of ecology must inform policy discourse. Environmental education of children and their families often takes place effectively in the outdoors, in the very areas that this chapter lists as the environmental resources of the county -- waterbodies, wetlands, floodplains, woodlands, and what it calls “scenic” and “natural” areas. Yet the Plan defines only one kind of park (the Regional Park) that has an acknowledged function of study and appreciation of the natural world. None of the “environmental resources” of the County described in the Plan could ever be fitted into the current set of categories for “park” and none of the existing parks, except for Wilderness Park, have an acknowledged role in connecting humans with the rest of the natural world.

Of the several kinds of remarkable natural areas in Lancaster County, the dominant ecosystem, the Tallgrass Prairie, “has suffered the greatest disaster of any ecosystem on the continent”⁸ About 98% of Lancaster County’s original prairie has been lost; only 7,600 acres of unplowed prairie remain, including hayed, grazed, and reseeded prairie.⁹ Plant diversity can be secured “only by protecting the native habitats and ecosystems where plants have evolved.”¹⁰

Plant diversity, that is, the full range of plant life that belongs to a particular ecosystem, has value to future generations in ways yet to be discovered. We know this will be true in the future because we can see that in the present we are finding important uses for wild plants in improving human food security and medicine. There are wild potato relatives in the Andes that are being used to develop domesticated potatoes resistant to blight that can help improve the crop worldwide.¹¹ The prairie, too, has a wild potato, that may well be of use in a similar way in the future.¹² Similarly, we know that at the present time, one quarter of the prescription drugs in North America and Europe contain active ingredients derived from plants.¹³ Over 200 species of native prairie plants are identified as being worthy of investigation for possible medicinal properties;¹⁴ there may well be more.

We know that the survival of species becomes less likely as habitat is fragmented. We cannot know exactly what choices will be available in the future if the Tallgrass Prairie in Lancaster County is preserved, but we do know that very little of it is left – perhaps about one tenth of one percent in the region.¹⁵ It would seem prudent to set a goal of preservation of all of what remains in reasonably undamaged condition – unplowed and unsprayed. The same is true for the saline wetlands, riparian forests and other special features. These lands are an investment, saved and available for the future.

Recommendations for Parks and Recreation

In the Parks and Recreation section titled “Goals”, we suggest these additions:

- Offer environmental education for children and adults through the Pioneers Park Nature Center and through cooperation countywide from schools, libraries and the university.
- Develop private funding by 2005 to fully support a program of acquisition and maintenance of natural areas in the county to which the public has access.

- As funds become available, determine priorities for preservation and negotiate sale of easements or natural areas land, according to landowner's preference, so that by 2020, all high quality habitat is preserved from development and available for public education.

In the Parks and Recreation section titled "Park Classification and Location", add:

- Natural Public Access Areas

Description: Areas of special environmental interest such as Tallgrass Prairie, saline wetland and riparian forest. Public access is provided through a conservation easement with the landowner or city ownership. Individual areas vary in size.

Contents: Informational signage and descriptive fliers available on site and from the Pioneers Park Nature Center. Small, unpaved parking area. No lighting or other disturbance.

Population Served: Lancaster County, especially its educational institutions and people from outside the area.

- Selection and prioritization of environmentally sensitive areas to be preserved by purchase or easement will be done in consultation with the County Ecological Advisory Committee. The Committee will study the advisability of setting up a dedicated fund with the Nebraska Community Foundation and report its conclusions to the County Board by June 1, 2001.

CHAPTER VII – URBAN DESIGN AND HISTORIC PRESERVATION

The Comprehensive Plan

The role of the current 1994 Lincoln City-Lancaster Counter Comprehensive Plan is to anticipate change, to be a benchmark for reference, and to be a framework for guiding sustainable development. In our group's perspective, our Comprehensive Plan should also be a statement of a vision that enrolls and involves the public, that states a balance be maintained between preservation and change, and that expresses our community's sense of values and directions.

Sustainable Development

Sustainable city development is development that meets present needs, allows for community maintenance at a reasonable cost, does not put development unduly at risk, and does not foreclose future options. Sustainable development is a present action with future consequences. The judgment of history, of course, is retrospective.

The current focus of this chapter is narrowly focused on buildings, sites and districts (i.e., built-up areas). We need to broaden our definition of historic resources, to identify and then protect our natural legacy areas.

Historic Preservation

An aspect of city-county sustainable development should involve preserving irreplaceable unique features of our rural countryside with its ridge line vistas, our native prairie ecosystem, and our green valley watercourses and marshes. These are as much a part of our Midwestern cultural heritage as our architectural and neighborhood historical buildings and other sites.

Recommendations

We must broaden our definition of historic preservation in the human influence context to include a full range of resources: whole farmsteads and associated fields, urban historical buildings and unique streetscapes. In the natural context, the broadened definition must include our few remaining remnant patches of eastern saline wetlands, native tallgrass prairies, natural riparian woodlands as well as vestigial savannah woodlands.

Historical aspects must be added to each land category in the Plan; where already written into the Plan, they should be followed.

The preservation ordinance needs to be more frequently referenced and applied as a guideline. Modern urban growth must actively seek to restore or reuse the best of what exists of older buildings and established neighborhoods.

Future growth must be positively encouraged to find innovative opportunities to preserve and protect historic farmsteads and riparian woodlands. Preserving riparian corridors will give opportunities for parks, trails, wildlife habitat, as well as structural and non-structural approaches to flood plain management.

CHAPTER VIII –PLAN MAINTENANCE AND IMPLEMENTATION

Chapter VIII of the comprehensive plan outlines numerous strategies for how to put the Plan into use and how to manage or maintain it. It is divided into seven sections. In reviewing each section, we notice that the first thing that stands out is the lack of any mention of the term “sustainability”. Sustainability must be a major component of every section within the chapter. It needs to be stated that no matter what strategy is used to implement the comprehensive plan or to maintain it, that strategy must move the community closer to being a more sustainable one. Practices that do not promote sustainability should be discouraged and even prohibited whenever legally possible.

In addition to incorporating sustainability into every section, the comprehensive plan must address the larger picture. It needs to become a document that promotes the “stewardship” of the land, not just a document that designates land uses for the future. The comprehensive plan can be seen as a document that affects not only the current generation, but future generations as well. Once the plan has designated a portion of land for a particular use, that use will be there for many, many years. A plan that takes on the role of stewardship will emphasize the many roles that land can be used for and promotes the principles of sustainability and multifunctional landscapes.

The current zoning and subdivision regulations do not address the concepts of transfer of development rights (TDR’s) and purchase of development rights (PDR’s). These concepts must be added to the regulations. An agency within the city-county government needs to be designated to coordinate activities and decisions to be sure that such concepts are maintained and followed.

Cluster zoning is addressed within the regulations, but it is seldom used. The regulation needs to be strengthened so that it becomes the norm for subdivision of land instead of an infrequent exception to the traditional type of zoning.

Regulations need to be established to provide for the better protection of the natural features and resources of the land. This should be accomplished by making sure that long-term environmental impact is one of the key factors that informs all decisions by the Planning Commission, the City Council, and the County Commissioners.

Design standards need to emphasize “sustainable design”. This would include designated types of building materials to use, how best to locate the building on the site, emphasizing energy efficiency and compatibility with the landscape.

Agriculture needs to become just as important of a land use as residential, commercial or industrial. Prime agricultural land could be included in a new agricultural zone that would have all of the pluses that the other, more traditional zones would have.

A stronger educational component needs to be added. This component would be implemented at various levels. There is the education of the elected and appointed officials within the government. They all need to know why there is a comprehensive plan and understand how it works. There is the continuing education of the community. They need to know how it works and how it affects each and every one of them. There is also the need to

educate everyone in the community on how the plan needs to be reviewed on a timely basis and what steps need to be undertaken for this process.

Changing the zoning is too simple of a process at this time. All it requires is for the “applicant” to file a form requesting changing the zone. That’s it. It falls on to the shoulders of the planning staff to investigate whether the applicant’s request is appropriate or not. This needs to be changed so that the burden of proof is on the shoulders of the applicant, not the city planning staff. Anyone filing for a zone change must submit a map that shows the property in question along with all properties within 500 feet. Second, the applicant must provide a list of all property owners names, addresses and phone numbers that live within 500 feet, along with a chart that states the percentage of each of these owner’s property that lies within the 500 feet. Third, the applicant must prepare a detailed report that explains why the zone change is being requested, how the change affects each (chapter) in the Comprehensive Plan and why this piece of property and the community are better for this change as proposed compared to locating the same activity on other sites elsewhere in the city.

A definite schedule in which the plan is reviewed in order to see if modifications are necessary needs to be a major part of its maintenance. To accomplish the goals of becoming a sustainable community, the ecological footprint of the community needs to be assessed during the comprehensive plan review process. The footprint will provide the community and those directly working on it to see how the plan has worked between the last review and the present one. In addition to determining the ecological footprint of the community, indicators of sustainability need to be developed and studied. These indicators will allow the community to evaluate their progress toward sustainability.

ENDNOTES

¹ Timothy Beatly and Kristy Manning, The Ecology of Place, Planning for Environment, Ecology and Community (Washington, D.C.: Island Press, 1997), 4.

² Ibid., 4.

³ 1994 Lincoln City-Lancaster County Comprehensive Plan (November 14, 1994, amended December 19, 1994), 35.

⁴ Ibid., 36.

⁵ Ibid., 37.

⁶ Ibid., 38.

⁷ Ibid., 00.

⁸ Fred B. Samson and Fritz L. Knof, eds., Prairie Conservation, (Washington, D.C.: Island Press, 1996), 13.

⁹ Lincoln Lancaster County Ecological Advisory Committee, Lancaster County Natural Resources, Trend Data and Sustainability Indicators Report, (Lincoln, 1997) I-15, I-7.

¹⁰ John Tuxill, “Appreciating the Benefits of Plant Biodiversity” in Lester Brown, ed., State of the World 1999 (New York, Norton, 1999), 108.

¹¹ Ibid., 96.

¹² The *Apios americana* is described in Kelly Kindscher, Edible Wild Plants of the Prairie, (Lawrence, University Press of Kansas, 1987) 46-53.

¹³ Tuxill, 102.

¹⁴ Kelly Kindscher, Medicinal Wild Plants of the Prairie, (Lawrence, University Press of Kansas, 1992) 10.

¹⁵ John Carlson, “Prairie is Unique, Almost Wiped Out”, Des Moines Register, December 10, 1997, reporting the conclusion of a study by the World Wildlife Fund: there is less than one tenth of one percent of native prairie grasses remaining in the Central Tallgrasslands of Minnesota, Iowa, Missouri, South Dakota, Nebraska and Kansas.

[Please complete this anonymous evaluation. We will compile the results and consider modifying the structure and conduct of the class in response to your comments and recommendations. Evaluation is a continuing and integral part of the course -- comments are always appreciated]

1. What have you learned about your learning style and involvement through this course?

2. How do you know if you have learned something?

3. What topic or activity has been the most valuable as a learning experience? Why?

4. What topic or activity has been the least valuable to you? Why?

5. How much time do you spend on this course relative to other 3-credit courses?

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
much more	more	same	less	much less

6. How would you rate learning in this course relative to other 3-credit courses at UNL?

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
much more	more	same	less	much less

Why?

7. Other comments?

1. *What have you learned about your learning style and involvement?*

- Learn best through visual & verbal experiences; being challenged on my beliefs; hearing different points of view
- News has been an interesting source of information; comfortable participating in classes
- Learn from other students' comments
- Like to know when things are due to plan ahead; we stray from syllabus early & often
- Learning is easy here
- Breaking up the 3-hour class in different segments; makes me feel interested
- Mixing up the methods has helped keep class interesting
- Truly don't learn something until I've heard it discussed;

2. *How do you know if you have learned something?*

- When I understand something
- When I can apply it in a different context
- When I see problems I didn't see before, and problems that may not be soluble
- When I hear high quality feedback from the class
- When I talk about it with other people
- When I have more information that can apply in my discussions
- When I can respond to someone outside this class with new facts/information
- When it causes me to strengthen or change my beliefs

3. *What topics have been most valuable as learning experiences?*

- All are valuable because they tie this subject & problems together
- Speakers have been valuable to learning; now I have more skills to discuss urbanization
- Knowledge of place exercise was really good; liked Sutton's presentation, now need to read Leopold
- Discussions are great for learning; good to have Rick's views as a realist as developer
- Discussions with the experts are especially useful
- Basic awareness of things going on around me in the landscape; sense of place exercise
- Human motivations class & activities helped me put together thoughts about why people have pursued their present course of development
- Article reviews keep me thinking about the course all week long; I'm constantly thumbing through the paper, internet, or magazines to find an article for class.

4. *What activity has been least valuable?*

- Sometimes the discussion drifts into theory; I like the applied examples
- Ethics topic was interesting, but in a capitalistic society & market orientatino it won't work or have much impact
- Would have learned more from the sense of place exercise if we had gone through it
- Sharing reviews of news \ we don't have enough time to review some good topics
- Group project of filling out pages; no feedback on why all those questions were important; sometimes the speakers drone on -- cut them off!

5. *Other comments?*

- I'm so excited Wednesday night when I get home, I can't sleep. My mind is on fire.
- Speakers have been excellent; structure is well done; three hours at a time is probably better than three classes per week; we have more time to think and work on topics.
- I seem to be drowning in reading material; some of it is OK, but some is extremely dry.
- We are able to share in a participative and dynamic way our thoughts and experiences in a respectful manner.
- We get quite a bit of paper all at once & it's important to keep it organized
- Class presents a broad range of subject matter; to help us sort through this it would be good to present learning objectives at the start to set a road map and help focus learning; these need to be more specific than "developing an understanding" of something
- Group activities challenge me to do my best



June 1, 2000

Dr. Dan Walters
279 Plant Sciences, 0910

Dr. Jack Siegman
740 OldH, 0324

Dear Dan and Jack:


Many thanks for your clear assessment of the course, **Urbanization of Rural Landscapes**, that you provided based on attendance at most of the class sessions as well as the interview with students on the evening of April 26, 2000.

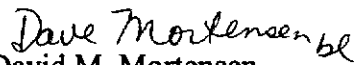
The major points that you provided in our session last Tuesday afternoon are summarized in the attached report. Please send us any misinterpretations we have made when transcribing the notes. It's extremely valuable to have experienced colleagues sit in the class, participate with their own expertise and points of view, and provide feedback to us as instructors after the course is completed. These were the key issues and recommendations we heard:

- need a balance of focus on national versus local issues; European examples would help
- one period dedicated to historical overview of urbanization would be good background
- more discussion is needed on the readings from the text, and better integration with course
- presentations by visiting specialists were excellent, but too long -- more discussion needed
- diversity of topics and speakers was a real plus for the course -- keep this range of topics
- mix of activities each evening was valuable, and students enjoyed the class environment
- focus on grad student expertise within the class was excellent -- validation of them as experts
- need a wider mix of political views for balance and insight on the development process
- cross listing in several departments and better advertising will bring people into course
- project activities need to start sooner and given more guidance through the semester
- more preparation by students before class will enrich the discussion

Thanks again for your help in the review. We appreciate the time and energy you invested.

Sincerely,


Charles A. Francis
Agronomy Dept.


David M. Mortensen
Agronomy Dept.

copies: Dr. Ken Cassman, Head, Agronomy (279 P.S., 0910)
Dr. Allen Williams, Chair, Sociology (OldH 711, 0324)

[NOTE: The following comments were provided by Dr. Dan Walters and Dr. Jack Siegman, formal evaluators of the new course on Urbanization of Rural Landscapes; Thanks to Dr. Walters, Agronomy, who agreed to coordinate the review and attended multiple sessions of the course, and to Dr. Siegman, Sociology, who attended the entire course as a participant. We sincerely appreciate their observations and suggestions on how to improve the course. Their comments are based on attending many of the course sessions as well as a closed interview session with students and observers of the class on April 26 at the last class session. As instructors, we provided them with a list of questions that we thought important]

- Need a balance of focus on national versus local issues; European examples would help. We had been concerned about the heavy focus on Nebraska, Lancaster County, and Lincoln as a prime study area, since the book is much broader in its coverage. The students did not share this concern, and appreciated the use of a local case study they considered close and relevant. Yet a balance is needed, along with a concrete example in the local context.
- One period dedicated to historical overview of urbanization would be good background. The last session that Jack Siegman presented gave useful perspective on the history of urbanization, and provided the type of background that should be included early in the course. We concluded as a group that an introductory session spent on the history of cities and competition for land resources would be valuable.
- More discussion is needed on the readings from the text, and better integration with course. Similar to last year's class, this group found that the text was a valuable resource but that more time should be spent covering the broad issues addressed in the text and discussing their relevance to the local situation. Examples from the text -- both data and case studies -- would be valuable for developing the project themes.
- Presentations by visiting specialists were excellent, but too long -- more discussion needed. This is a difficult issue to control, and as instructors we should be clear when we invite outside resource people that we have expectations for a brief presentation and then most of the time spent on discussions. Since many of the invitees are academics, it is often hard to convince them that the lecture method is not particularly effective as a learning approach. This deserves more time and thought to solve the dilemma.
- Diversity of topics and speakers was a real plus for the course -- keep this range of topics. We used virtually the same set of people in the two years of the course, and they were well received both times. Perhaps we could bring in one or two new people each year to add variety and broaden the discussion, while keeping those who best connected with students as returnees. Using students from a prior class as resource people and presenters was a real plus, and provided some continuity for the course.
- Mix of activities each evening was valuable, and students enjoyed the class environment.

Having a combination of invited presentations, discussions, small group work, and short presentations by students seemed to please the class -- and we almost always ran short of time even with the three-hour sessions on Wednesday nights. It is essential to provide a mix of stimulating activities in an evening class to maintain interest and engagement of students who have been working all day or who have been in other classes.

- Focus on student expertise within the class was excellent -- validation of them as experts. This was especially important for the graduate students who brought certain skills and prior expertise to the course. In a couple of cases, they were used as presenters or facilitators for topics, and this was a good component in the course. In this spring's course, several people from the community added greatly to the experience base, especially in the context of Lincoln and Lancaster County.
- Need a wider mix of political views for balance and insight on the development process. The presence of two developers in the course was great, and brought a perspective that was lacking in the first year of the course. One of them was outspoken and willing to contribute to the discussion, as well as hosting a stop on the field trip in April. We need to continue to recruit from both the broad student community and from the city of Lincoln. It is essential that we get larger student numbers, and also get the nontraditional students to register formally and pay tuition. We need a number of 20 or more to really reach the community and to justify the faculty time in this course. The current room can easily hold 30 students at tables, although smaller numbers are better for discussion and sharing of information.
- Cross listing in several departments and better advertising will bring people into course. We will request cross-listing and a formal course number for the coming school year. The departments on our list for now include Agronomy, Horticulture, Ag Economics, Community and Regional Planning, Sociology, Marketing, Anthropology, Political Science, and Geography. We will prepare the request for a new course, and send this to the curriculum committees of these departments to see how many are willing to have the course listed in their departments. This should be done ASAP so that the numbers can be included in the spring class schedule, and to facilitate recruiting in the departments.
- Project activities need to start sooner and given more guidance through the semester. Students felt that the project was not presented in an explicit enough form, and that the goals kept evolving through the semester -- to the point that they were uncertain of what was expected. We were all disappointed in the project reports, and felt that they were not as in depth as in the previous year. Students needed more incentive to do a good job on these, also their individual or small group efforts should be finished a month before the end of the semester to allow time for synthesis.
- More preparation by students before class will enrich the discussion. The reviewers said it was apparent that the instructors spent a large amount of time in preparation, but that there was much less preparation by students for each session. Having the topics tied more closely to the discussion, and putting more encouragement into the reward system would help.

LINCOLN
Journal Star

UNSIGNED EDITORIALS ARE THE OPINION OF THE LINCOLN JOURNAL STAR

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Stevens Creek study heralds new era for city

When the Lincoln City Council gave approval last year for a study of the Stevens Creek watershed, then-Councilman Curt Donaldson compared it to President Thomas Jefferson giving Lewis and Clark the go-ahead to begin the Voyage of Discovery.

The expedition might not yet have left. But the boats are at the water's edge. The crew has been selected. It won't be long before the city planners plunge into uncharted terrain.

New Planning Director Kathleen Sellman said her department will begin holding open houses and committee discussions. She plans to begin a newsletter and Internet site to keep the community apprised of the study's progress.

Planner Terry Brinkman arrived in Lincoln this month to oversee the project. He's fresh from Ann Arbor, Mich., where he headed a similar project.

The timing is right for the study, just as it was for Lewis and Clark's fabled expedition. Implications for the future expansion of the city are enormous.

The Stevens Creek basin is bordered roughly by 84th and 148th streets, Nebraska 2 and Salt Creek near Interstate 80. Stevens Creek meanders through the middle of the 52-square-mile tract, an area about two-thirds the current size of Lincoln.

The study will address numerous questions. Most immediately, where should the east beltway be located within its designated corridor? Looming largest of all is how much it would cost to install sewers in the basin. The price tag for sewers and roads has been estimated at more than \$160 million.

The study will lay the foundation for future land use decisions: Where should houses be built? Where should businesses be located? How can development be incorporated with the planned east beltway? Where can parks be established? What about bike trails? How can the flood plain be protected?

Summary: Stevens Creek watershed that lies on the eastern boundary of Lincoln's current city limits is a prime designated area for future expansion. Currently in farmland and acreages, this area has the advantage of close proximity to the city limits and services, but building there will push suburban sprawl farther from the city center. Also involved is the question of location of the east beltway, and the cost of sewer systems especially on the eastern drainage of the watershed. There is concern on the city council that "We've got to do this right. We can't make the mistakes that we made elsewhere in the city." The decisions by city council will become part of the comprehensive plan.

Evaluation: There is no question about the need for additional building sites with close proximity to Lincoln, and the Stevens Creek watershed is a likely area for expansion. Current concerns include how much influence this expansion will have on continued sprawl toward a new beltway, who will pay the high cost of additional services, and what the impact will be on the hydrology of this watershed. It is important to set long-term goals in the comprehensive plan for Lincoln

Summarized by Chuck Francis

Rick Krueger, a member of the Homebuilders Association of Lincoln, pointed out that the study can help avoid future squabbles by designating space for ball diamonds and soccer fields. A recent dispute over soccer fields in Lincoln ended up in court.

City Councilman Jonathan Cook identified the promise of the study when he said, "We've got to do this right. We can't make the mistakes that we made elsewhere in the city."

County Board Chair Kathy Campbell, City Council Chair Colleen Seng and Mayor Don Wesely deserve credit for keeping plans for the study on track, with the help of prodding from the homebuilder's organization.

Under the study's timetable, its findings could be incorporated in the City-County Comprehensive Plan by next year.

The study has not come without controversy, of course. Some members of the Planning Commission disapprove of the study, believing the city already has enough land for the next 20 years in two large tracts of land, one north and one south. The Mayor's Neighborhood Roundtable has voted to oppose expansion into Stevens Creek.

But thoughtful, deliberate planning now is better than ignoring the open space at the eastern edge of the city while acreages and other developments spring up without consideration of future growth. If done properly, the Stevens Creek study will blaze a path that future generations will appreciate.

Developer, city closer on north Lincoln project

Summary:

Developers and Lincoln city officials are coming closer together on a new development project in the North portion of the city. The proposed 450-acre site that overlooks the northern portion of the city will include 1,400 homes and 1.3 million square feet of commercial/industrial space. There have been a series of hurdles in the way of this project, including environmentally sensitive wetlands and traffic problems.

No costs have been put together at this point, but this project includes over nearly five miles of four-lane roadway and lengthy sewer and water line extensions. Most likely the costs will be split between the two parties. City officials have been nervous since last fall when Centurion announced their intentions to invest in a \$10 million plant in the area.

Since then city and private developers have worked together and they have agreed upon two key portions of the development will occur. The first is the development of Alva and Arbor roads into the major arterials streets for the area between North First and North 56th Street. The second point will be the preservation of wetlands adjacent to North 27th Street. One medium sized issue left to decide is the possible courses of action for a 30-acre parcel near Interstate 80. The developers don't want to place homes that close to the interstate for fear the lots may not sell and the city is concerned about traffic flow in the area.

Relevance:

The way in which urban areas are developed is a very sensitive issue. Individuals, private companies, and local government need to join together to protect environmentally sensitive areas and meet the most important needs of the community. People need places to live and work. They also need schools, churches and streets to travel to and from, with these things come in businesses that supply goods and services to them.

Problems occur in deciding the way in which the new areas will be developed. All parties involved want the best usage of the land. Disagreements can occur of the definition of "best use". All types of development have advantages and disadvantages. High-density development places the most number of people per unit area and therefore uses the least amount of land. However, transportation of goods, services, water and sewer in and out of the development can be a problem. Low-density development is the least efficient in the terms of housing people per unit area, but offers people their own dwelling and more opportunities for recreation and other things associated with a higher quality of life. With any type of development, steps need to be taken to minimize the impact on natural vegetation and aquatic life.

*This is the core
of the challenge,
isn't it?
Good choice
OK*

February 22, 2000

Developer, city closer on north Lincoln project

BY MARK ANDERSEN

Lincoln Journal Star

How many millions of city dollars and when?

Before bulldozers carve a 450-acre ridge overlooking north Lincoln into lots for 1,400 homes and 1.3 million square feet of commercial/industrial buildings, those questions need answers.

"It always comes down to money and the timing of the money," said Robert Hampton of Hampton Development Services.

Hampton and city staff already have overcome several potential roadblocks to the proposed development north of Interstate 80 between North 27th and North 14th streets. Those ranged from environmental to traffic issues. The city's big motivation was keeping 1,200 jobs at Centurion International. The discovery that gravity sewers could serve the area also removed a roadblock.

Planning Director Kathleen Sellman said Hampton and the city didn't appear close to an agreement when she visited Lincoln as a job applicant last fall. "There's been a real effort on both sides to get things worked out," she said.

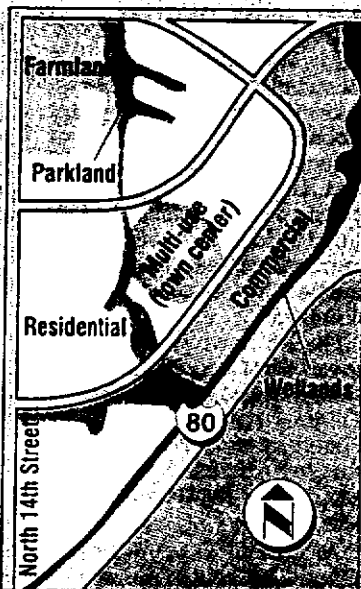
Originally proposed as North Creek North, the development now is being called Stonebridge Creek. Hampton said an actual stone bridge would carry a new arterial road over a proposed bike trail through the project.

The public and County City Planning Commission will get to comment this week on the proposals. The project will be introduced at Wednesday's Planning Commission meeting, but discussion there is likely to be delayed until March 8. The city also has scheduled an open house and informational meeting for 5 to 7 p.m. Thursday at Goodrich Middle School, 4600 Lewis Ave.

If officials ultimately accept the proposed land-use agreements, the larger issues of who pays and when will be worked out over the next three to five months, Sellman said.

Stonebridge Creek

Proposed land use plan for Stonebridge Creek, formerly North Creek North, a 450-acre area bounded by Interstate 80, Arbor Road, North 14th and North 27th streets. The northwest corner cannot be sewered and would remain farmland. The proposal identifies a new major arterial road connecting Alvo and Arbor roads. Also identified are 100 acres of commercial/industrial space, 35 acres for an urban village, with the remainder residential, parks and wetlands.



Source: Lincoln/Lancaster County Planning Commission
D. MATT VAN DRIEST, Lincoln Journal Star

No estimate of utility costs has been done, she said, but the project includes nearly five miles of four-lane roads and lengthy sewer and water line extensions. Public costs could climb well into the millions of dollars. Most Lincoln developments rely on a mix of private and public funds for roads, sewers and water.

Hampton said his timetable was to begin construction of Centurion's building this fall. Residential development would begin in 2001, with construction of a 35-acre urban village of shops and offices — and possibly movie theaters — in 2002.

Last fall Hampton simultaneously announced the proposed residential development along with Centurion's announcement of its new \$10 million plant. Gov. Mike Johanns called Centurion's investment good news, but city officials reacted with surprise and concern.

Since then, Hampton and city staff have agreed that:

- Alvo and Arbor roads north of Lincoln will connect and eventually become a major arterial between North First and North 56th streets.

- Wetlands adjacent to North

27th Street will be protected. Additional land will be set aside for wetlands creation. Together, they will protect the scenic corridor into Lincoln.

One medium-sized issue has not been resolved: what to do with an additional 30 acres along the interstate. Hampton would prefer to develop it as commercial/industrial; the city objects on the grounds of traffic congestion and the need to protect Lincoln's scenic entryways.

"My contention," Hampton said, "I don't want to build houses along the interstate. I can't sell the lots."

In other parts of America, concrete or wooden sound barriers separate residential housing from interstates, he said. "That's not very attractive."

He proposes concrete or brick industrial and commercial buildings, which he said would be attractive. Lincoln needs more highly accessible, highly visible commercial lots, he said.

Planners say I-80 runs below the 30-acre site and could be shielded against noise with landscaping. They also say that while new roads will divert much traffic, additional commercial development will increase the load on North 27th Street.

"A lot of people are concerned about North 27th Street traffic today," said Assistant Planner Stephen Henrichsen.

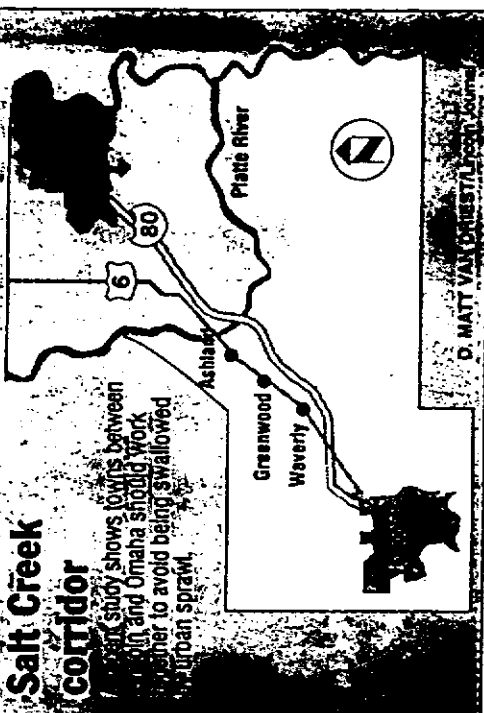
Mark Andersen can be reached at 473-7238 or mandersen@journalstar.com.

Study outlines new vision for Lincoln-Omaha corridor

BY AL J. LAUKAITIS
Lincoln Journal Star

Waverly, Greenwood and Ashland must work together if they don't want to be swallowed by growing urban sprawl from Lincoln and Omaha.

That is one of the conclusions of a recent study of the Lower Salt Creek region, which includes those three communities, as well as U.S. 6 and Interstate 80, and Salt Creek, a major tributary of the Platte River. "Discovering the Land in Between" was done last fall by 14 graduate students in a community and regional planning studio class at the University of Nebraska-Lincoln. It recommends, among other things, building recreational trails and a na-



ture center and possibly designating U.S. 6 as a scenic byway. "We are proposing that communities really work together to preserve their small-town/urban feel, while the metro areas start to encroach on them," said Dan Warner, one of the participants in the study. "This is an area that hasn't gotten a lot of attention planning-wise."

Students examined the corridor between Lincoln and the Platte River in August under the direction of Associate Professor Kip Hulver. They chose the area because of the likelihood that Ashland, Greenwood and Waverly will feel growth pressure from the state's two largest cities. "With a combined population of nearly three-quarters of a million

people and growing, that distance is rapidly shrinking," the study's authors wrote. "The pressure to populate and develop this region has increased enough to warrant a new approach for the communities and people living in this 'land in between.'"

Ashland already is feeling the pinch of urban growth. Iron Horse, an upscale housing development with an 18-hole championship golf course, is being built on the edge of town. A state park, aircraft museum and wildlife park are nearby, and an outdoor amphitheater is in the works.

The students focused on the environment, government, economic development, preservation of

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LINCOLN ■ SOUTHEAST NEBRASKA

Sunday
January 9, 2000

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Page design: Matt Oiberding

Study/New vision for corridor

Continued from Page 1B

agricultural land, urban encroachment, transportation and social concerns of the region. Here are their recommendations:

- Use natural surroundings in the development of hiker/biker trails along the U.S. 6 corridor. Connect the trails to recreational facilities and existing trails.

- Develop a nature center showcasing unique wetlands along the Salt Creek corridor near Greenwood.

- Advocate a feasibility study of a recreationally based reservoir in the corridor and establish a wood-and-buffer zone along Salt Creek.

- Preserve open spaces and views in the corridor through progressive zoning strategies and clustering development.

- Seek designation of the U.S. 6 corridor as a scenic byway. Enhance community entrances and market the highway as a unique alternative route.

- Initiate seasonal activities in each community for social and economic benefit.

- Establish a council of governments to promote interlocal cooperation in pursuing corridor objectives and vision.

Waverly Mayor Ron Melbye said he had not seen the study but believed its basic premise of working together had merit.

"All of the communities want to work together and preserve the area, and we will work together toward anything that will better any one of our three communities," he said Friday.

Melbye said officials in all three communities talked often and cooperated on issues. For example, Waverly has sent its tar machine and personnel to Ashland to do some work in exchange for Ashland mow-

ing a cemetery in Waverly.

Melbye said Waverly most likely would grow toward the north, east and south instead of west to Lincoln. He said the area west of town was extremely flat, and on the whole, not suitable for housing developments.

"Waverly is a growing community," Melbye said. "We've got a sound planning commission. It's current and up-to-date. Zoning ordinances are being worked on as we speak. They are fairly current, but like everything else they need to be upgraded once in a while."

Ashland City Administrator Chris Anderson has read the study and says there are a lot of good ideas. But whether the three communities can or should work together is another matter.

"I think it's going to take a different, untraditional mind-set for communities to think about doing joint projects," Anderson said. "We've always been focused on the confines of our own communities."

He said Ashland had agreements with Waverly and Greenwood to share services and equipment to avoid duplication.

"I really don't know if anybody has thought about the need to work together," Anderson said. "There are not any real glaring issues that we have to address. ... We deal in priorities. Sometimes there are more pressing issues than others."

Due to time constraints, the study did not have a lot of public participation, Warner said. Some Ashland residents have seen the study, but it has not been disseminated widely.

"This is how we see it (the corridor) as a class. Communities may not see it as we do," he said. "This is a vision — a starting point."

Al J. Laukaitis can be reached at 473-7243 and alaukaitis@journalstar.com.

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MONDAY | October 04, 1999

THE STATE

UNL Conference Reflects Statewide Issue

Smart Growth Advocates Seek Support Urge Nebraskans To Get On Board

By JOHN BARRETTE
October 01, 1999

Advocates of smart growth want Nebraskans to combat sprawl and protect greenbelt farmland near cities by reaching beyond their tree-hugging circle to join hands with a growing array of potential allies.

Elizabeth Merritt, head of the legal defense fund at the National Trust for Historic Preservation, argued that it is better to influence policy in the statehouse and city hall than to wind up in the courthouse.

Merritt, one of three keynote speakers at a one-day conference in Lincoln on Sustainable Growth and Preserving Environmental Heritage, said the smart growth movement nationwide is appealing to a wider group than tree-huggers and preservationists.

"There is a tremendous public clamoring for more growth management to protect the quality of life across the country," she said while touching on transportation issues and related topics last weekend.

The clamoring, she said, has spurred some mayors and governors to align themselves with the national Smart Growth Coalition or its goals.

More to the point are players such as utilities that view unbridled growth as a problem because of costs to extend services to outlying areas, according to Merritt.

She said others joining the environmental and preservation forces in the sustainable growth ranks include welfare reform

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UNL Architecture Dean Cecil Steward and Elizabeth Merritt of the National Trust for Historic Preservation check a Lincoln map

advocates, who know many working poor people don't have cars to join the commuter crawl, and religious leaders who realize inner city decay harms their flocks.

Some banks have joined the ranks of smart growth promoters, Merritt said. Bank of America in California funded a study, she said, that showed sprawl has shifted from an engine to an inhibitor of growth.

Slowing growth that mows down cornfields in the heartland or eats up coastlines, east and west, is best achieved in Merritt's view by working with decision-makers and appealing to the public rather than by "hunkering down and filing a lawsuit" after an adverse decision.

"These decisions can be influenced through advocacy and better public policy," the preservation attorney said.

She said sprawl that impacts such places as Omaha, Lincoln and other cities causes a particular type of problem: "You must drive to every place that you need to go, especially to your office."

Low density development at the cities' fringes thwarts strong public transportation and causes urban dwellers to languish in traffic, causing frustration. "The result is a tremendous loss in quality of life," she said.

Sprawl also means people must drive to shop, which has contributed to the growth of shopping malls and super stores. Merritt said there are 20 square feet of shopping center space for every U. S. citizen, yet there also are 4,000 abandoned centers.

Merritt was joined at the conference by her national trust colleague, Robert Nieweg of the trust's Denver office, and by Karin F. Marchetti, general counsel for the Maine Coast Heritage Trust.

Marchetti outlined ways to fight the loss of greenbelt farmland near cities, putting stress on conservation easements in keeping land away from speculators who fuel growth-at-any-cost development.

One sponsor of the gathering at the city campus Student Union at the University of Nebraska-Lincoln was the Friends of Wilderness Park organization, which Marchetti said brought her in to give her talk. The park in southwest Lincoln has developers and preservationists at odds.

Marchetti decried "speculation by people who have suppressed their connection to the land" while acknowledging that opponents of development "may be seen as thwarting economic progress."

She said it is difficult to convince government officials that too much growth will spawn problems, in part because society

is driven by glitz and glamour of city life. "Our culture tends to love the glossy, the urban."

She outlined ways for landowners and land trusts formed by environmental or preservation groups to keep land out of the hands of developers.

Some include easements, options to buy land with covenants barring development, and estate plans to help make such methods feasible when taxes loom with the passing of a landowning generation.

Nieweg, also an attorney, offered tools to help bootstrap decaying downtowns and nearby neighborhoods. Yet he was realistic about flight to the fringes in most communities.

"I'm not going to fool you and tell you that you can stop sprawl," he said. Consequently, he said, the battle is to "hold the center."

He cited the national Main Street Project, which over the years has helped 1,400 communities rehabilitate 70,000 buildings and create 47,000 "net new businesses." He said those changes resulted in "175,000 net new jobs" for the towns and cities involved.

Cecil Steward, dean of the UNL College of Architecture, opened the conference and served as moderator. He called for understanding of the essential relationships and the interdependence needed in forging sound communities. ■



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County "making progress" in water fight with Lincoln.

This review is based on the February 10 article in the Wahoo Newspaper and includes an article in the same paper two weeks earlier on the same subject.

In the first article county objections were stated to Lincoln's settlement agreements with other parties that would require Lincoln to lower aquifers by 25% and harm Saunders county and its farmers. The Assistant Saunders County Attorney, Grant Porter, stated the county has property in the Lincoln well field and riparian rights to the river. Lincoln has had monitoring wells in the county for over 10 years and have not had a county permit. He further stated parts of the agreement are unconstitutional and that Lincoln has no right to draw down Saunder's county aquifer 25%.

The second article details the legal processes that have taken place or upcoming hearings. The City of Lincoln must show cause why the County should not be a party to Lincoln's application. Lincoln must also show cause why they have not applied for permits for two wells located on the Platte River island in Saunders County the past ten years and monitoring data on other wells.

I feel this issue can best be settled by the courts and Saunders county has a very legitimate concern. If the facts are as stated regarding non compliance of testing and data reporting, it leaves the impression Lincoln is showing a complete disregard for the residents of Saunders County.

County "making progress" in water fight with Lincoln

By Liz Neal
Staff Reporter

Saunders County is getting heard. "We are making progress," stated Grant Porter, Assistant County Attorney.

On Feb. 4, the Nebraska Department of Water Resources held their pre-trial hearings with regard to the Objection Saunders County filed against the City of Lincoln well fields and also the Complaint against Metropolitan Utilities District.

Porter stated he had until Feb. 28 to write a brief for the DWR on the Objection the County filed objecting to the City of Lincoln's application for induced recharge and appropriation of surface water from the Platte River.

The City of Lincoln and the other objectors have until March 13 to respond why the County

shouldn't be a party to Lincoln's application.

In addition, an Order to Show Cause was sent out on Feb. 2 to the City of Lincoln. Porter stated they have requested that the City of Lincoln show cause why they haven't applied for permits for two wells located on a Platte River island located in Saunders County for the past ten years and why Lincoln has not provided monitoring data on other wells in compliance with conditions of their permit dated May 7, 1990.

There are several issues before the DWR, Porter said. With regard to the Complaint Saunders County filed against Lincoln, the hearing examiner issued an order that Lincoln has until Feb. 25 to file any motions or pleadings with the DWR which would include answers to Saunders County's Complaint. With regard to the Complaint, there has been no hearing date set yet. The DWR denied Saunders County's request to

have depositions and interrogatories begun at this time.

According to Porter, the DWR also held it's pre-trial hearing with regard to Saunders County's complaint against Metropolitan Utilities District.

"In that particular hearing, the hearing officer requested MUD file a response to Saunders County's request for a hearing," stated Porter.

The hearing officer gave MUD until Feb. 25 to file pleadings, motions or briefs with the DWR. Saunders County has until March 24 to respond to any briefs, pleadings or motions that MUD will be filing.

Once all the briefs, pleadings and motions are filed by the City of Lincoln and also by MUD, then hearing dates will be scheduled and witnesses will be called.

Department of Water Resources

hears county's objections

By Liz Neal
Staff Reporter

Progress is being made in hearings before the Nebraska Department of Water Resources according to Grant Porter, Assistant Saunders County Attorney.

"The County presented a good case with a lot of good evidence and good testimony," stated Porter.

Porter told the Saunders County Board of Supervisors Tuesday that the DWR had an all day hearing on Jan. 28 to hear whether Saunders County would be permitted to be a party concerning Lincoln's application for induced water recharge and appropriation of surface water.

"I can't tell you whether we will get to be a party," Porter added. "We put in some awfully good evidence."

Porter stated that they showed the county owns property in the Lincoln well field according to the deeds and chain of title.

Saunders County has riparian rights to the river. Porter objected to Lincoln's settlement agreements with the other parties that would require Lincoln to lower the aquifers by 25 percent and harm Saunders County and its

farmers.

"We did as good as we could do," Porter added. Porter estimated it would be approximately two months before a decision could be expected.

Pretrial conferences will be held Friday Feb. 4 in Lincoln before the DWR regarding Saunders County's complaint against Metropolitan Utilities District.

Saunders County had filed a complaint against MUD on 17 causes of action including that wells had not been properly registered.

The conference will discuss when the hearing should be held, discovery deadlines and the witnesses to be called.

"We need to look into hiring an independent hydrologist," added Porter. "I guarantee they will have lots of them."

Feb. 4 is also set for pre-trial hearings on Saunders County's complaint against Lincoln for having illegal wells.

"They do not have industrial ground water permits nor permits to lower lake levels," stated Porter.

The County sent a Notice of Violation on Dec. 15 ordering Lincoln to comply with zoning regulations and other county permits for its wells.

So far the Saunders County Attorneys office has not received anything in writing nor was Porter aware of any activities on Lincoln's part to obtain the needed county permits for its wells.

Porter suggested to the Supervisors that he prepare an Order to Show Cause why the County shouldn't take further action.

Some of Lincoln's monitoring wells are on Saunders County's right of way. For ten years, Lincoln's horizontal wells on the northern part of the island in Saunders County have not had a County permit.

"We have had the certified surveyor's plat placed into evidence with the State" added Porter. "We gave Lincoln 45 days to do something. They have done nothing."

Porter said he was not saying the County should issue a cease and desist order yet but let Lincoln know the County is serious about this and 45 days have gone by.

"Show us why they have violated the County permit requirements on this for 10 years and why they aren't coming forth to get permits. We have always tried to work with them."

Supervisor Steve Clark asked Porter how many people testified at the hearings last

week.

Porter stated it was mostly a procedural matter but that Supervisor Bob Gottschalk and Zoning and Planning Administrator Jerry Divis explained why Saunders County should be allowed to be a party to the case. Register of Deeds, Don Clark, testified giving the chain of title to the property.

"What is important to me is that they (DWR) look at the facts and act on it to prevent Lincoln from draining the Platte River and aquifers," stated Porter.

Porter filed a Petition for Declaratory Ruling with the DWR asking the state to make a declaratory ruling on the settlement agreements on the basis of Lincoln's application. That the settlement agreements entered into with all objectors by the City of Lincoln are not legal and do not serve the public interest.

Porter said that some parts are unconstitutional and that Lincoln has no right to draw down Saunders County's aquifer 25 percent and to hurt our citizens before obtaining surface water from upstream junior appropriators. Porter stated that any interested person may file a Petition for Declaratory Ruling and the State has no legitimate reason not to rule on the Petition.

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Larry Cutforth
Article #7
Urban sprawl curbs food production, study shows

Summary:

Urban sprawl reduces the ability of land to convert carbon dioxide into biomass according to recent satellite imagery research. Researchers at the Goddard Space Flight Center combined satellite imagery of city lights with landscape imagery of photosynthetic potential to perform the analysis. In dense urban areas, the photosynthetic potential may be reduced up to 20 days. Unfortunately, development has also occurred in the areas with the best resources. Researchers recommend that development be planned on poorer soils despite higher construction costs to conserve productive land for a growing population.

Relevance:

This research confirms the intuitive conclusions that urban sprawl reduces photosynthetic biomass production and consumes the best land. The study showed that human activity can actually increase productivity by irrigating residential lawns in semi-arid landscapes. However, this may be considered an inefficient use of scarce water resources. The authors also do not mention the influence of our high levels of resource consumption on urban sprawl. I believe the authors of the study need to evaluate their findings in greater depth.

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Urban sprawl curbs food production, study shows

Monday, February 28, 2000

By John Roach

Urban sprawl limits the ability of the land to take carbon dioxide out of the atmosphere and convert it to biomass, researchers conclude from an analysis of satellite imagery.

"Humans tend to congregate where the best resources are," said Marc Imhoff, a researcher at the Goddard Space Flight Center in Greenbelt, Maryland. "Is it wise to take the best soils and turn them into parking lots?"



Researchers used a specially outfitted Lear jet to collect thermal data about the Atlanta metropolitan area, shown here during the daytime. White and red markings indicate areas with the highest temperatures.

Courtesy NASA

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"Is it wise to take the best soils and turn them into parking lots?"

Marc Imhoff, Goddard Space Flight Center

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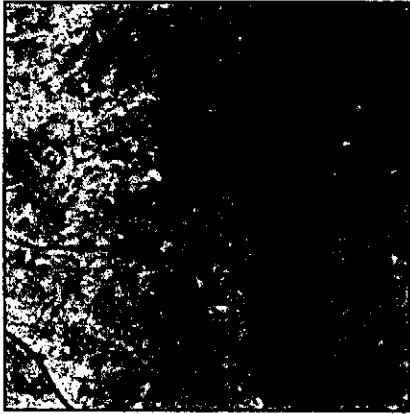
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To find out, Imhoff and his colleagues took satellite imagery of city lights, which serve as a measure of urban sprawl, and combined it with data from another satellite that records the photosynthetic potential of the landscape.

"By merging the satellite data we could examine how urbanization affects the potential of the land surface to carry out photosynthesis by looking at the 'greenness' index inside and outside the urbanized area," he said.

It turns out that urban sprawl can reduce the photosynthetic ability of land by as much as 20 days in areas where construction is particularly dense. Put another way, said Imhoff, the effect is like turning out the lights in a greenhouse for 20 days.

With only 3 percent of the land in the United States covered by urban development and ample arable land yet untapped, urban sprawl does not yet pose a significant threat to the nation's food supply.



In contrast to the heavily developed areas surrounding metropolitan Atlanta, a suburban area shows some shades of blue indicating cooler temperatures.

Courtesy, NASA

"In countries like Egypt, where there is not much arable land and all the urbanization is taking place along the Nile River, in terms of local food supply it is a serious issue," said Imhoff.

However, the study also showed that human activity could increase productivity by altering the environment. "For example, this was the case for arid and semi-arid areas where lawn irrigation and planting changed the ecosystems from shrub lands and desert to deciduous forests," said Imhoff.

Since human survival depends on photosynthesis, the researchers hope urban planners will find the study useful. Imhoff suggests that cities should be built on poorer soils, even though construction costs might be bit higher.

"As population increases we are going to have to rely on our soil resources more and more," said Imhoff. "Because of their style of consumption, in Europe the amount of land needed to support urban areas is 100 times larger than the urban area itself."

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Related Sites

To learn more about this study, visit the [Urban Growth Seen From Space](#) web site.

The [Sierra Club](#) has an extensive campaign to fight urban sprawl.

The [Smart Growth Network](#) is dedicated to issue of fiscally and environmentally responsible growth.

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Review by Chuck Francis, Jan 13, 2000

Dreaming Big in Coffee Creek, by Gillian Klucas.
Conservation Voices, Dec/Jan, 2000, p. 12-15.

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Summary: Can you imagine a development of a full section (640 acres) of land on which 1200 homes will be built, no stormwater or wastewater will leave the section, and close to one-third of the area will be maintained in native habitat for common use? This is the scenario in Coffee Creek, a new alternative approach to building near Chesterton, Indiana, the dream of unconventional developer Jerry Mobley. In fact, Jerry is in the process of making this dream a reality.

The project will "blend traditional neighborhood design with ecological-based planning and development." Success will depend on cooperation among a team of specialists -- engineers, architects, planners -- who will work with ecologists to provide a series of landscape and ecosystem functions that are essentially obliterated in most conventional subdivisions across the U.S. Before starting to lay out the area, ecologists are working to restore woodlands and prairies, healing the erosion that is destroying the current stream, and planning how these landscape features can be preserved in the final design. There will be a range of house sizes for people of different income levels, and innovative transportation options that contribute to a model for long-term sustainable development. Education will be a key component, as demonstrations are set up in the public areas to inform others about this unique place. Coffee Creek is surely a model for the future.

Relevance: The Coffee Creek project is one that deserves a close watch as we seek alternatives for future developments. There is growing segment of the population that is highly aware of the challenges we are facing as land is used up by conversion to housing and urban sprawl, as natural landscapes and farmland are converted to other uses, and as the ecosystem services these lands provide are cancelled out by pursuit of individual goals and profits. It will be useful to interview residents of this new place, to evaluate the opinions of visitors, and to see if this model is emulated in other places. The plan is exciting, and one that breaks out of the normal mode of development. Hopefully we have local developers in the Lincoln area willing to take similar risks.

As cookie-cutter communities sprawl across America,
one developer has set out to prove that environmentally sustainable towns
are attractive and affordable alternatives.

Jerry Mobley is a developer. He knows that to be successful he should buy some land, plow it up, and build row after row of identical houses. He might also set aside a few acres of land for a Wal-Mart and its parking lot. And maybe he'll throw in a ballpark.

There—a bedroom community. It could be one of any number of communities found from coast to coast. But Jerry Mobley is no ordinary developer. He knows there's another way—and he set out to prove it.

Mobley, president of Lake Erie Land, envisioned a community that brought together Old World charm and new design techniques to create an environmentally sustainable community where people would want to live and work.

Coffee Creek Center, a 640-acre extension of Chesterton, Indiana, is now becoming a reality. The self-contained community of 1,200 homes is an ambitious attempt to blend traditional neighborhood design with ecological-based planning and development. Those

involved say it will be a model for urban planners, landscape architects, and waste and stormwater engineers across the country.

Dream Bigger

"Mobley reached out to whoever the best in their area was, whether it was transportation or water management or building design. Then he said, 'Okay, dream bigger,'" says Katie Rizer, Lake Erie Land's director of fun—an odd sounding title but real.

We want to restore the stable hydrology that would have been present throughout the upper Midwest."

So before any buildings go up or roads laid out, ecologists are restoring woodlands, prairies, and Coffee Creek, a small stream with severe bank erosion. The creek is part of a 185-acre area to be preserved for an unlimited time that bisects the land. The team also is developing storm and wastewater systems that will be incorporated into the community's natural and recreational features.



James Patchett, president of Conservation Design Forum, is developing an environmentally sustainable town in Indiana.

And they are. But the key to their success, say many of those involved in the project, is that they are dreaming big together. Architects, planners, engineers, and ecologists sat down to share their ideas and expertise to create the ideal community. Their unified approach helps ensure that the design is cohesive and that nothing is overlooked.

Creating an ideal community begins with understanding and working within the natural hydrology of the land, says James Patchett, president of Conservation Design Forum, a member of the Coffee Creek team. Human development and agriculture have altered the watershed from an infiltration-based groundwater hydrology to one of flash flooding and streambank erosion. "Our ultimate goal is to prove that you can design a densely populated urban community that generates no surface-water runoff and no wastewater discharge of any type," says Patchett. "Virtually all of the water will be cleansed, treated, captured, utilized and absorbed on-site.

Using Mother Earth's design

The Coffee Creek team is using a variety of techniques to handle the area's storm and wastewater, says Patchett. But none of these techniques involves traditional treatment facilities or holding basins.

The stormwater system the team designed carries runoff through a series of perforated pipes packed in gravel that encourage the water to infiltrate into the groundwater system as it travels to the creek corridor.

Overflow water will run into a series of ornamental, naturalized water features, such as a pond and waterfall area. After that, the water flows through a series of gradients built along the corridor's contours. The overflow water bubbles up through a small drain onto a level gradient planted with native species whose root systems help absorb the water. If the water overflows that gradient, it flows into the second gradient built lower down. The process continues until all of the water is absorbed into the ground.

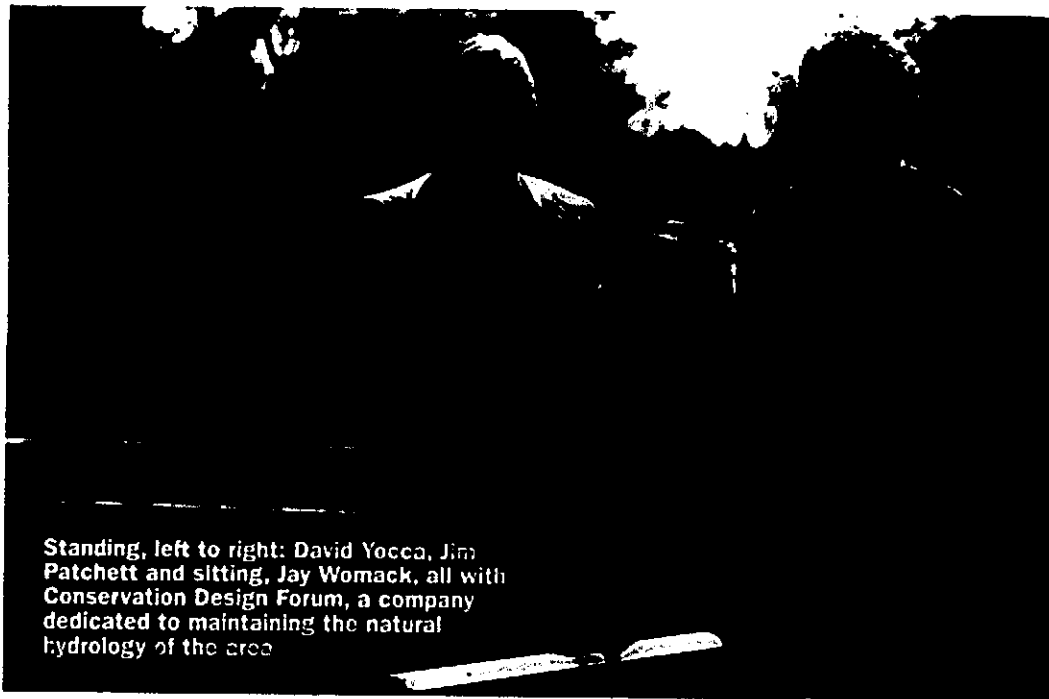
"The beauty of this is that the only thing that comes to the surface is a 2-inch wide drain," Patchett says. Walking along the creek's trails, "you'll just see these beautiful woodlands and prairies with the wildflowers and native grasses."

To cut down on stormwater even entering the system, some buildings will have "green" roofs, Patchett adds. Common throughout Europe, a green roof has three to four inches of soil planted with grasses and wildflowers. The roofs absorb 70 to 80 percent of the precipitation, much of which will evapotranspire back into the atmosphere.

Robert Wolfe, director of ecological services at J.F. New & Associates, says the 4.2 million gallons of wastewater the Coffee Creek Center occupants will generate daily, also will be treated using a system incorporated into the natural environment of the area.

Wastewater will be pumped into wetlands, constructed by planting wetland species directly into gravel placed in a 2-foot deep depression. As the water flows to the other end of the wetland system, the plants and bacteria treat the wastewater, which stays about two inches below the gravel. After the water is clean, it's allowed to percolate into the ground.

"It's a low-tech solution in that we are letting bacteria, sunlight and plants do the work for us," says Wolfe, adding that the wetlands



Standing, left to right: David Yocca, Jim Patchett and sitting, Jay Womack, all with Conservation Design Forum, a company dedicated to maintaining the natural hydrology of the area

Wolfe says that using wetlands to treat wastewater is not a new technique—some people even create mini-wetland treatment systems in their backyards. But this may be the first time wetlands are being used exclusively in such a large community, he says.

That's why it's important to document Coffee Creek's effectiveness, Patchett adds. Research will be conducted on both the waste and stormwater treatment systems so that the information can help other communities design similar programs.

"Education is a critical key to all of this. Almost everything we do flies in the face of most codes and ordinances from site planning, development, landscape, and certainly storm and wastewater engineering." - Jim Patchett

themselves contribute to the area's natural and recreational features. "It's going to be a large open space that grassland birds—many of which are endangered or threatened from loss of habitat—will be able to use. It's a place where people can walk their dog. You would never know that it was part of the wastewater treatment facility."

The benefits of Coffee Creek's new storm and wastewater systems go beyond creating natural habitats and recreational areas, Wolfe adds. By allowing water to infiltrate into the ground, the treatment systems are maintaining the area's natural hydrology. Traditional systems hold the water in big ponds for 24 hours, then dump the water into the creek, which can cause flooding, erosion and ecological problems by altering the creek's temperature.

And it will help educate—and convince—city planners. "Education is a critical key to all of this," Patchett says. "Almost everything we do flies in the face of most codes and ordinances from site planning, development, landscape, and certainly storm and wastewater engineering."

Lake Erie Land made education a component of its long-term goals. For example, to help educate the public, the team is creating a restroom facility along the Coffee Creek corridor that will demonstrate the community's ecological design. Educational signs will explain the building's green roof, natural building materials, and mini-wetland system. The company also plans to encourage upstream landowners to adopt watershed-friendly agricultural practices.

Sustainable Living

"We're not just developing a cornfield subdivision," says Jay Womack, a landscape architect with Conservation Design Forum and Coffee Creek's project manager. "There's no other place in the United States that's going to this depth and level to incorporate nature into the manmade environment and to have a sustainable community."

Residents will enjoy not only the recreational trails and open spaces, Womack says, but also the environmentally friendly characteristics built into the town itself. Coffee Creek is designed to be a cohesive, pedestrian-friendly village with unique home designs that encourage neighbor interactions.

"There won't be any big-box retail stores or malls four miles outside of town that people drive to and park in a half-mile wide parking lot," Womack says. "It's all going to be smaller mom-and-pop shops and restaurants that people can ride their bikes or walk to." Coffee Creek's downtown buildings will include retail stores on the first floor, professional offices on the second floor, and apartments on the third floor. To create a thriving downtown area, people must live there, Womack says.

In addition to downtown living, Coffee Creek will include neighborhoods with a variety of housing options—from small apartment rentals to estates, which Lake Erie Land officials say they believe will attract mixed-income residents.

Other sustainable features include electric car shuttle and taxi service, long-lasting building materials and solar and wind energy for smaller energy needs. "Everything we do is predicated on a philosophy of sustainability," Womack says. "Sustainable is not only about not cutting down trees any more; it's about using solar energy in your home or not creating pollution."

The Coffee Creek Center is in the first phase of development. The team is building recreational amenities, such as a 6,000 square foot pavilion and a plaza for farmers' markets and festivals, brick streets are being laid, and home construction begins next spring.

Leading the way

Hundreds of people from all over Indiana are on the waiting list in hopes of moving into Coffee Creek next summer. They're lining

up in droves, says Lake Erie Land's Rizer, proving that, for some at least, the village is a desirable alternative to anonymous suburbia.

Rizer says the company understands that Coffee Creek's popularity might drive up housing costs as it has in other unique neighborhoods. To head off that possibility, Lake Erie Land wrote into the covenant that a certain percentage of homes must remain affordable. Today, the average cost of a home in Coffee Creek Center is \$140,000, Rizer says.

Although some homes will be built next summer, the entire project's master plan spans the next 15 to 20 years. Traditional developers have to get their money out in three to five years, so they don't take a long-term view of a community, Rizer says. But Lake Erie Land's parent company, NiSource, is helping to finance Coffee Creek. "There's a higher investment initially, but over the term of the project, there will be higher returns," Rizer says, adding that Coffee Creek will show other developers and the banks that finance them that they can invest over a longer period and help the community at the same time.

Demonstrating long-term benefits to Chesterton's city officials was also critical. Coffee Creek's water management and city planning required numerous zoning variances. Rizer says it has been important to seek input from city officials and other community members who had concerns about Coffee Creek.

"They've been very cooperative," says Rizer. "They've taken the time to educate themselves." It helped that Chesterton, a town of 10,000, was already incorporating pedestrian-friendly features into its downtown.

Ecological services director Wolfe, like others committed to Coffee Creek, says Lake Erie Land is on the cutting edge. From transportation to green construction techniques to socioeconomic factors, "they put everything into one package."

Wolfe says he hopes other developers will take Jerry Mobley's lead and create inviting, sustainable communities, but he admits that not every developer will be able to incorporate every aspect of Coffee Creek Center.

"I think in the next five years you'll see people applying pieces of it," Wolfe says. "Maybe doing everything will become the standard in 15 to 20 years." ■

Gillian Klucas is a freelance writer based in Denver, Colorado.



Structure built in Coffee Creek Center.

Photo by
Wendy Hall
for Conservation

Economic Benefits of Open Space Bibliography Market for Open Space

Blanding, Cindy. August 1994. "The Changing Face of Outdoor Enthusiasts." Parks and Recreation.

"By the year 2000, nearly 15 percent of the population will be 65 years or older; but this older population will be unlike any that has gone before it. Physically and cognitively active lifestyles are becoming the norm for older adults."

"Participation in outdoor recreation activities affords older adults many benefits. It allows them new experiences in new places, stimulates new interests, and is physically, mentally, and emotionally stimulating. It also helps them get in touch with themselves and with nature and enhances their understanding of their place in nature and awakens senses. Opportunities for development of self-image and self-confidence, cooperation and trust, and physical fitness are also provided. These benefits often are only realized through recreation participation in a natural environment, and older adults are seeking these benefits along with the enjoyment the outdoors provide in increasing numbers."

Crompton, John L. 1993. "Repositioning Recreation and Park Services: An Overview." In Trends: Justifying Recreation and Parks to Decision Makers. Vol. 30, No. 4.

"Each year more than 250,000 Americans retire and move to another state. Retirees have become an attractive economic development target for communities. Retirees look for a desired retirement style, and studies have consistently reported that recreation and park facilities and programs are one of the deciding factors in retirees choosing a new location at which to reside."

Backman, Sheila J., and Backman, Kenneth F. 1993. "The Role of Park and Recreation Services in Retiree Relocation Decisions." In Trends: Justifying Recreation and Parks to Decision Makers. Vol. 30, No. 4.

"Retiree migrants were estimated to have produced an after-tax income of over \$15 billion from 1975-1980. In addition, the income of retiree migrants tends to be more stable than worker incomes,

since much of retirement income comes from Social Security, military, civil service, state, and local and private pension funds."

"The availability and diversity of recreation opportunities is a key decision factor in most retiree relocation decisions. Recreation opportunities are of primary importance to retirees contemplating relocation."

"Retirees begin 'shopping around' and their tourist-like behavior during their decision process results in tourist dollars. Most retirees have visited the areas they move to at least once on a vacation and in most cases visit these potential retirement areas numerous times."

"When considering a move, studies of immigrant retirees in Florida, Texas, North Carolina, Massachusetts and South Carolina all found recreation and park facilities to be one of the deciding factors in choosing their new area of residence."

"The private developers of retirement housing have quickly identified the importance of recreation and park facilities and programs to the financial success of their developments. Naturally, their advertisements target these quality-of-life benefits. Potential buyers are inundated with glossy ads and videos depicting lush golf courses, sparkling tennis courts, fancy riding stables, crystal blue pools and pristine walking trails as well as the prominent activities and programs offered by the area's public recreation and parks agencies. These amenities are up front and center stage."

Rivers, Trails and Conservation Assistance Program. 1995.
Economic Impacts of Protecting Rivers, Trails, and Greenway
Corridors. Department of the Interior. National Park Service,
Western Region, San Francisco, California.

"Bicycling attracts people of all ages and interest in this activity is retained from childhood into later years. With the aging of the U.S. population, bicycling will likely retain its popularity as a 'lifetime' activity. In the United States, the rate of participation in bicycling triples since the early 1960's. By the end of 1993, there were more than 100 million bicyclists in the United States. This represents an increase of over 33 percent in the last ten years (Bicycle Federation of America, 1994). Bicycles are used for commuting to work as well as pleasure and fitness. There were 2.7 million bicycle commuters in the U.S. in 1987, more than double the number in 1982."

"In-line skating has also become extremely popular in the U.S. in just the past few years. from 1991 to 1993 participation in the sport increased from approximately 6 million to 12.5 million in the U.S. (NSGA, 1994). In 1993, 4.6 million pair of skates were sold,

generating \$310 million (Sports Style Magazine, 1993). The industry estimates a 30 percent increase in skates sold and dollars generated in 1994."

Urban Land. December 1994. "Oriole Park at Camden Yards."

Regarding the new ballpark built in downtown Baltimore:

"The ballpark's location and orientation reinforce its connection to the city and helped revitalize a downtrodden area of Baltimore. Previously, the 85-acre site consisted of deteriorating industrial buildings and warehouses, many of which were abandoned. The stadium has breathed new life into the area and enhanced the development potential of nearby sites."

Wade, Beth. February 1994. "The Economic Poop on Municipal Zoos." American City and County.

"Directors attest that well-run zoos are excellent marketing tools for the city, with economic benefits that include job growth and community revitalization. But the rewards are often long in coming and they are costly.

'Historically, zoos have never been looked upon as money makers,' says Rich Buickerhood, director of the Dallas Zoo. 'But the zoo can be an economic stimulus and one of the key drivers for the city.'

According to Pat Simmons, president and chief executive officer of the non-profit society that manages Akron, Ohio's zoo, "the zoo is not a source of income in direct dollars to the cityit contributes to the economics of the community. We draw more people than any other like entity (i.e., non-profit attractions like museums and historical sites). The fact that we are in the inner city means that more people are coming into the city. We augment downtown revitalization."

"Grant Park, the neighborhood surrounding Zoo Atlanta, is being revitalized. (The zoo will) bring a lot of people to Grant Park. They're spending money in the community again." Terry Maple, president and chief executive officer of Zoo Atlanta's non-profit management group.

**Fresno (City of) Little Hoover Commission. March 1992.
"Report of the City of Fresno Little Hoover Commission to the Fresno City Council: Land Acquisition and Recreational Facilities."**

"From 1965 (when the original acreage for the park was purchased)

to 1974, land prices increased approximately 400%, from \$1,600 per acre in 1965 to \$6,350 per acre in 1974, or, without compounding, an average nominal increase of 44% per year. Park land for a regional park could have been acquired at that site five years ago (in 1990) at \$5,000 per acre. Today (1992) the price for the same land would be approximately \$10,000 to \$15,000 per acre a nominal 20-30% increase in the price of the land.

The penalty incurred to date for not having acquired this 1,000 acre five years ago, if the relatively low cost riverbottom land was the acquisition site, would be approximately \$5,000,000 to \$10,000,000. the economics of land banking for the city's park land needs, due to the population growth of the next decade alone, would substantially increase the projected savings from this strategy. Similarly, neighborhood and community park land cost can be substantially reduced by current land banking; this is well illustrated by the 50 acre acquisition at Woodland Park."

Hauserman, Julie. "Green Infrastructure." Landscape Architecture. v. 85, no. 7.

"The old Cross-Florida Barge Canal corridor has become the 110-mile long Cross-Florida Greenway State Recreation and Conservation Area, the centerpiece in Florida's planned greenways system. IN one of the most far-reaching 'greening' efforts in the nation, public and private interests envision a 'green infrastructure' for Florida, an undertaking as carefully planned and managed as the state's highway system.

It is a series of ecological and cultural 'hubs,' connected by multiuse 'spokes' and 'corridors' stretching from Miami to Pensacola.

When public lands are linked together, you get more bang for your conservation buck and fractured planning efforts are organized into a cohesive whole, says Mark Benedict, director of the Florida Greenways program, a project of the Conservation Fund and 1000 Friends of Florida, a growth-management watchdog group."

"For Florida's 150th birthday this year, the state will recognize 150 greenways that will link the state's various ecosystems, providing habitat for the native flora and fauna, which are under siege from development. The planning work has been financed with both public and private dollars -- mostly private. More than \$1 million will come from the Intermodal Transportation Efficiency Act (ISTEA). Greenways have won institutional support, as well, with the Florida Department of Environmental Protection setting up an Office of Greenways & Trails. Nearly every state agency - including the departments of Commerce and Transportation - has signed off on the

'green infrastructure' idea.

Florida has a lot of greenways opportunities emerging,' says Chuck Flink, ASLA, of North Carolina-based Greenways, Inc. 'It's a natural evolution in a state which has the types of problems that Florida has -- population growth, the economic impacts of that growth, struggling traditional agricultural industries. The Florida landscape continues to be a major draw for people throughout the world. They want to see these native landscapes. Going to Disney isn't the same.'"

"As population growth continues, 'greenways may be the saving grace for Florida,' says Nathaniel Pryor Reed, a Florida environmentalist who cochaired the Florida Greenways Commission. 'If we're going to add four million people to Florida in the next ten years, we are going to have to have greenway corridors in every community. We need that green infrastructure to survive.'"



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Article draft for Sept/Oct issue of Land and Water magazine

Using Ecological Systems for Alternative Stormwater Management

*by Steven Apfelbaum and Jack Broughton
Applied Ecological Services*

Before the 1830s, when the Midwest was still considered Wilderness, the first white settlers in our region could hardly recognize the streams that are now bear familiar names on the maps of our region. Original land survey records of the U.S. General Land office identified many of the streams we know today only as vegetated swales, wetlands, wet prairies and swamps.

Today, the broad, clear, meandering waterways of the past are comparatively fast-running, usually sediment-clouded streams with distinct banks and relatively frequent flood events. Lost are millions of acres of wetland and wildlife habitat, fisheries habitat and healthy ecosystems that once made the central U.S. a highly functional stormwater drainage system and an extremely productive natural area.

A review of the historic data shows that dramatic increases in discharges have occurred during low, median and high flows since settlement times. "Modern" channels have either been formed inadvertently through erosion caused by increased water volumes and flow rates, or intentionally as channels were created to drain land for development and agricultural uses.

In fact, current discharges may be 200 to 400 times greater than historic levels, based on data recorded from 1888 to the present on the Des Plaines River in southeastern Wisconsin and northeastern Illinois.

While land development in both urban and agricultural areas has changed stormwater runoff patterns from diffuse overland flows to increased runoff rates and concentrated flows, the opportunity to emulate and restore historic stormwater patterns exists through the integration of natural ecosystems in our urban and rural landscapes.

Ecological solutions to stormwater management are now beginning to prove easier to maintain, less expensive, more attractive and more beneficial to wildlife than conventional stormwater management solutions.

Critical Role of Wetlands

Both historically and today, wetlands have played an important role in the maintenance of regional water balances. They also contribute significantly to the performance levels of stormwater and floodwater management strategies.

Because our river systems have changed substantially, it is important to understand the magnitude of the changes in our rivers, wetlands and their tributary upland ecosystems, if we wish to comprehend the changes in hydrology and hydraulics these systems have undergone.

Future engineering approaches to stormwater management – even in highly urbanized environments with limited open space – can benefit greatly by incorporating restored ecological systems (wetlands, upland prairies and forests) as important elements of creative, cost-effective solutions.

These ecological systems can improve our management of stormwater and floodwaters while simultaneously offering secondary benefits of improved wildlife habitat, increased biodiversity, enhanced water quality and expanded open space that are not typically provided by conventional approaches to stormwater management.

Historic Functions of Hydrologic Systems

Today's rivers are clearly the most obvious indicators of changes that have occurred in their watersheds. Thus, an understanding of the hydrology of rivers can help us determine the magnitude of hydrologic change that can result from incorporating wetlands, prairies and other landscape features of ecological systems as functional elements in water resource management.

Studies of the Des Plaines River and its watershed region have identified hydraulic and hydrological changes associated with the initial clearing of land for agricultural purposes and for present-day urban development. Over 90 percent of the historic native vegetation in the Des Plaines River watershed, including wetland, prairie, savanna and woodland systems, has been lost or severely degraded.

The result is increased stormwater runoff, higher suspended sediment loads, reduced stability of stream geometries, decreased stream system functions, deteriorated water quality, degraded river wildlife and fisheries habitats and, ultimately, vanishing human opportunities that contribute to our quality of life.

The Q & A's of "Conservation Development"

What opportunities exist for developments in urban and rural areas to re-establish a percentage of the historic wetlands, prairies and forests? What benefits and costs would be associated with the pursuit of these opportunities? In addition to water quality and flood management, are there other benefits that can be factored into the cost/benefit equation?

These questions are fundamental when we're considering the integration of natural systems and conservation principles into developments that impact water resource management. Only in the past few years have answers begun to emerge from the residential and commercial "conservation development" projects that have undertaken to solve such a cost/benefit equation. And, while rock-solid scientific and financial conclusions may still be somewhat elusive, owners of these development projects are convinced the benefits of restored wetlands and prairies outweigh the costs.

In a conventional urban development, the questions are not even asked.

Typically, urban developments may cause increased stormwater runoff rates and volumes along with increased runoff of contaminants such as sediments, fertilizers, de-icing materials, heavy metals and other chemical constituents. Conventional residential developments generally strive to maximize building density, reserving open space only on individual lots, while public open space is created only as required by ordinance for recreational parks or stormwater management purposes.

Stormwater management in a conventional development is concerned only with minimizing on-site and downstream flooding, along with some nuisance aspects of stormwater runoff. Consequently, most urban stormwater systems consist of storm sewers to convey runoff, a detention basin and an outlet structure in the basin to control stormwater release rates.

The Prairie Crossing Model

Perhaps the best model of a conservation development designed for water quality goals and environmentally sensitive stormwater management is that of Prairie Crossing, a 667-acre residential development in Grayslake, Illinois. The Prairie Crossing project has taken a series of measures to reduce runoff rates, runoff volumes and pollutant loads. In addition to voluntary source controls, these measures include integrating large-scale restored landscapes into the development as a major element of the stormwater management system.

The stormwater management system consists of natural open swale conveyance systems, upland prairie biofiltration, wetlands, and a lake. In combination, these increase runoff lag time, increase opportunities for pollutant removal through settling and biofiltration, and reduce the rate and volume of runoff through enhanced infiltration opportunities. Prior to development, the site was farmed under an annual crop rotation. Soils were modified by drainage improvements, including an extensive tile system, and the native biological communities had been eliminated.

The Prairie Crossing project includes a high-density "village center" and an outer area of clustered homes. Open space has been restored to the prairie, wetland, wet prairie, and savanna communities historically found on the site. This restored landscape provides a unique living environment for the residents of Prairie Crossing. An additional 150 acres of agricultural lands are integrated into the development to maintain the rural agricultural landscapes of the area.

Stormwater Management "Treatment Train"

Open space at Prairie Crossing was planned to provide stormwater management for the project. The system, called the Stormwater Treatment Train[®], was designed with sequential components that contribute to the treatment of stormwater before it leaves the site (see Figure 1).

Stormwater from the built areas is routed overland into open conveyance swales planted with native prairie and wetland vegetation, rather than through storm sewers. The swales provide initial stormwater treatment, primarily infiltration and sedimentation. The prairies are the second component of the Stormwater Treatment Train. Prairies diffuse the flows conveyed by the swales, and the reduced stormwater velocities maximize the prairie's sedimentation, infiltration and evaporative water treatment.

Additionally, the natural adsorption and absorption of the prairie soils enables the soil able to hold many contaminants. And the aerobic condition of the soil promotes hydrocarbon breakdown. The prairies are able to infiltrate a substantial portion of the annual surface runoff volume due to their increased soil permeability which is created by the deep root systems of the prairie vegetation. Wetlands provide both stormwater detention and biological treatment prior to runoff entering the lake, which also provides stormwater detention, further solids settling, and biological treatment.

The components of this Stormwater Treatment Train system were designed to treat stormwater runoff for water quality benefits, and to reduce stormwater runoff peaks and volumes.

An indication of the success of the project in reaching water quality goals is that a consortium of conservation organizations last year established a pilot program to stock threatened and endangered non-game fish species into the lake at Prairie Crossing. Fish survival this year has been excellent due to the outstanding water quality and excellent habitat established with diverse native aquatic vegetation planted along the lake shoreline.

And, as a system, the elements of the Stormwater Treatment Train have combined to actually reduce the amount of stormwater leaving the Prairie Crossing site, compared to pre-development runoff volumes when the site was in agricultural use, and compared to similar conventional developments.

This alternative stormwater solution combines the four treatment elements into a management system that minimizes the need for stormwater structures, enhances the living environment, and minimizes the negative impacts of urban development. Based on published BMP effectiveness information and hydrologic modeling, the Prairie Crossing development can be expected to reduce surface runoff volumes by 65% and reduce solids, nutrients, and heavy metals loads by 85% to 100%. Source controls will minimize the impacts of the development even further.

The result not only reduces costs to the developer, but also reduces maintenance costs for the community. There is also a substantial benefit to downstream neighbors. By treating stormwater where it falls on the land, Prairie Crossing is reducing its contribution to downstream flooding and sedimentation.

Conservation Development Gaining Momentum

Because of its high level of commitment to healthy ecosystems, the Prairie Crossing development is unique in northeastern Illinois and probably most of the country. However, the concepts of conservation development, clustered housing and stormwater best management practices are not unique; and in fact, are rapidly gaining wider acceptance among developers and regulators.

In southeastern Wisconsin, Bielinski Development Corp., has made a strong commitment toward the concept of conservation development, and is initiating all future projects with a thorough ecological inventory of existing natural resources on potential development sites.

From that baseline, Bielinski -- the largest home builder in the state -- is working with ecologists from Applied Ecological Services and land planners from Vandewalle & Associates to design sites that preserve valuable resources, buffer them from the impacts of developed areas and restore healthy wetland, prairie, savanna and woodland ecosystems.

Bielinski has plans to incorporate the Stormwater Treatment Train on all of its project sites, in part to simply develop the land for improved stormwater quality, and in part to set some examples for other developers.

One Bielinski development being held up as an example to others is a 39-acre site in Germantown, Wisconsin that was chosen in a regional competition as one of three Model Conservation Development Projects of the Great Lakes region by the national non-profit group, The Conservation Fund. The site is designed for 31 single family lots and nearly 60% protected open space which integrates mature woodlands, restored prairie, buffers, swales and a restored wetland.

Conclusion

Wetlands and prairies can provide years of essentially free stormwater management service, however, if they are mismanaged, the cost can be considerable. To maintain higher quality, desirable wetlands, stormwater supplied to the wetlands should be higher quality, and the delivery should be somewhat predictable. This may require pretreatment of stormwater in systems that are likely to experience extremes.

Not all wetlands are equal from the perspective of biodiversity, wildlife habitat, water cleansing, human-use, and aesthetics. Using wetlands for water quality management purposes can compromise the conservation of high quality wetlands; however, this should not discount their importance or feasibility for use in water resource management. It simply illustrates the importance for engineers to work closely with other disciplines to present accurate and adequate information to decision-makers.

In conclusion, taking an ecological system approach not only focuses on the importance and use of wetlands in stormwater management, it is also an important future direction for water resources management.

For Further Reading

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(Stormwater Treatment Train Graphic – Caption)

Figure 1 - Functional elements of the Stormwater Treatment Train © include conveyance swales, prairie buffers, wetlands and lakes, with anticipated stormwater management and water quality benefits in each element.

The Prairie Crossing Project: Attaining Water Quality and Stormwater Management Goals in a Conservation Development

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Abstract

Relative to undeveloped lands, typical urban developments generate increased stormwater runoff rates and volumes, as well as associated contaminants relative to undeveloped lands. Sediments, heavy metals, fertilizers, de-icing materials, and many other chemical constituents are found in runoff from residential and commercial developments.

The Prairie Crossing project, a large residential development, has taken a series of measures to reduce runoff volumes and pollutant loads. These measures include source controls and integration of large-scale restored landscapes into the development to serve as the stormwater management system. The landscape stormwater management system is composed of upland prairie biofiltration, natural swale conveyance systems, wetlands, and a lake. Combined, these increase lag time, increase opportunities for pollutant removal through settling and biofiltration, and reduce the rate and volume of runoff through enhanced infiltration opportunities.

This paper is a preliminary and brief analysis of the expected water quality and stormwater management benefits provided by this project, designed as a "conservation development." Proposals are currently being prepared to monitor the project's water management benefits and performance.

Introduction

Typically, residential developments maximize the building density (for a given zoning classification) and incorporate potential open space into individual lots. Public open space is only provided where required by municipal ordinance for use as parks or for stormwater detention purposes. These lands usually are grassed and used for playgrounds, ball fields, and other active uses. Stormwater detention basins are usually grassed or rip-rap ringed open water areas used to temporarily detain stormwater.

Stormwater management for urban development is typically concerned only with the prevention of onsite and downstream flooding and the nuisance aspects of stormwater runoff. Consequently, stormwater systems consist of a storm sewer system to convey runoff to a detention basin. The sewer system eliminates the nuisance aspects of stormwater and detention basins control the very large stormwater runoff events from developments which would cause downstream flooding.

Historically, detention basins designed for flood control have provided only limited water quality improvement by capturing some suspended

solids. This improvement has been incidental and only for storm events for which detention time is significant. Only recently have detention basins begun to be designed to provide water quality benefits in addition to flood control. However, this has created problems for wet detention basins also intended to serve as recreational and aesthetic amenities since accumulating sediments and nutrients cause hypereutrophic conditions.

This paper presents the stormwater management system developed for the Prairie Crossing project in Grayslake, Illinois. The Prairie Crossing system is designed to manage stormwater runoff rates, and additionally, to improve stormwater quality and reduce runoff volumes. The project attempts to offer an alternative stormwater management system to conventional land development by using large, restored landscapes as a "stormwater treatment train system."

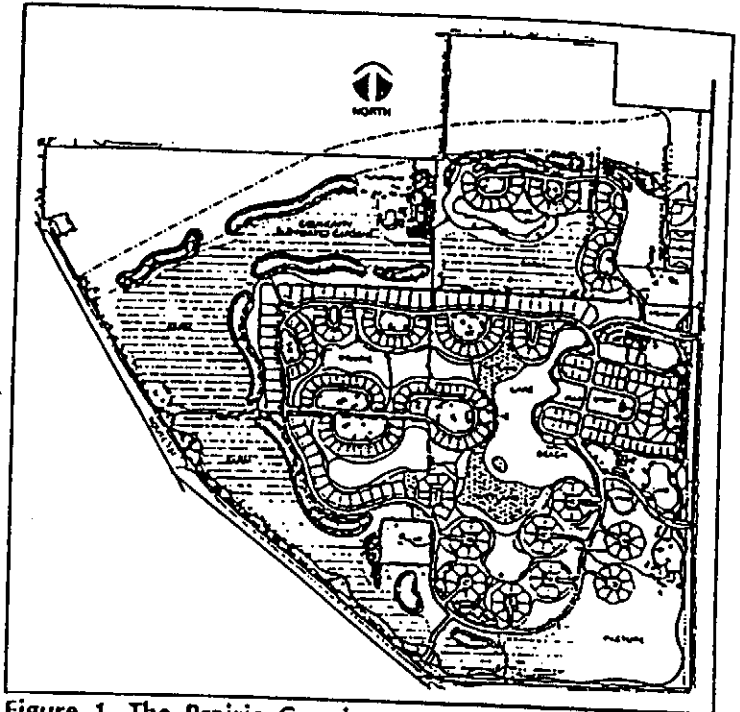


Figure 1. The Prairie Crossing community will have 317 single-family homes on 667 acres of gently rolling countryside. More than 350 acres are devoted to natural prairies, marshes, lakes, gardens, pastures, and farm fields.

Background

Prairie Crossing occupies 667 acres in central Lake County, 40 miles northwest of Chicago, Illinois. The site has been farmed under an annual crop rotation and has deep silt and clay loam soils from glacial till parent materials. The land has been modified by drainage improvements including an extensive tile system, agricultural tillage for perhaps 150 years, herbicide and pesticide use since the 1950s, and the elimination of native biological communities.

The Prairie Crossing project will include 317 homes on 132 acres of the site with a high density "village center" and an outer area of cluster homes surrounded by open lands (Figure 1). The remainder of the site will be retained as open space and agricultural lands integrated with the residential development. The open space in and around the residential area is being restored to emulate historic functions and the aesthetics of presettlement prairies, wetlands, wet prairies, and savanna communities that occupied the site prior to and during the initial settlement by Indo-European immigrants in the 1830s. This restored landscape will provide a unique living environment for the residents of Prairie Crossing. The project includes the development of a 22-acre lake, 13 acres of wetlands and 160 acres of created

prairies. An additional 150 acres of agricultural lands (protected by conservation easement held by the Conservation Fund) are integrated to protect the rural agricultural landscapes that, until recently, typified this area of Lake County.

Stormwater Management "Treatment Train System"

The open space in the Prairie Crossing project is designed to provide stormwater management functions for the project. The stormwater system has been designed as a treatment train with several components that each perform in sequence to treat the water before it enters the central lake and then leaves the site (Figure 2). Stormwater runoff from residential areas outside the village center is routed into swales planted with native prairie and wetland vegetation. These swales are the initial component of the treatment train and convey runoff from roadways and residential lots into expansive prairies while providing a modest amount of infiltration and settling of solids. The prairies are the second component of the treatment train. The prairies slowly convey stormwater as diffuse

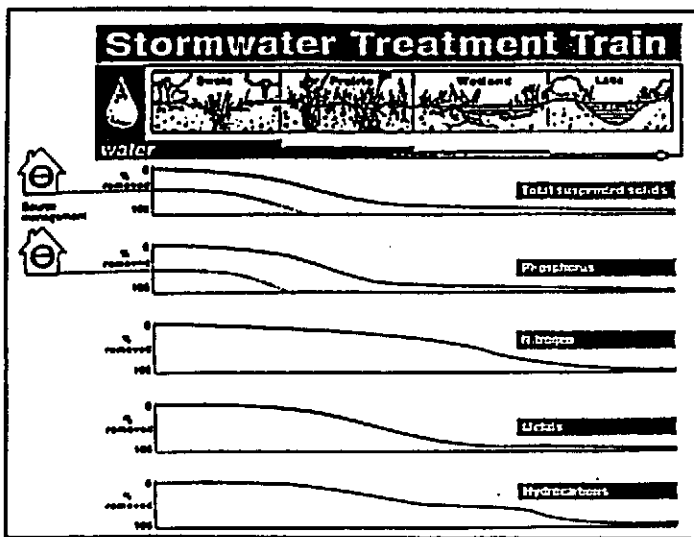


Figure 2. Functioning elements of the Stormwater Treatment Train and the anticipated general stormwater management and water quality benefits in each element.

overland flow to the wetland systems bordering the lake. The prairies are expected to infiltrate a substantial portion of the annual surface runoff volume due to their very deep root system and provide for additional solids settling as well as biological treatment. The wetlands are the third component of the treatment system and provide both stormwater detention and biological treatment prior to the runoff entering the lake. The final treatment component is the lake. The lake will provide stormwater detention as well as further solids settling and biological treatment. The components of this stormwater treatment train management system are designed to treat the stormwater runoff and reduce the stormwater runoff peaks and volumes.

Landscape Management

Over 50 percent of the development will be native restored prairie and wetland landscape. This landscape requires minimum maintenance. Mowing will occur during the first several years of plant community establishment and then prescribed burning will replace mowing. Fertilizers will not be used in the prairies or wetlands. Herbicides will only be used by direct wick application to treat any target noxious weeds as may be required during the initial establishment years. Irrigation will not be required to establish or culture the native plant communities.

Effectiveness of the Stormwater Management Treatment Train

The purpose of this paper is to present the treatment train concept as a viable method of managing stormwater that also provides an excellent living environment—and not to present an exhaustive analysis of the effectiveness of the treatment train. The authors intend to collect hydrologic and water quality data over several years to better quantify those benefits. However, to provide some indication of the expected benefits of the Prairie Crossing treatment train, a preliminary analysis is presented here.

The potential effectiveness of the treatment train as applied to Prairie Crossing was estimated using published information (Schueler 1987, Horner et al. 1994, Moshiri 1993) regarding expected pollutant removal of the various treatment train components combined with continuous hydrologic modeling using HSPF (USEPA 1993). The hydrologic modeling was used to evaluate the influence of local climatic, soil, and site conditions that are difficult to account for based solely on published data.

Figure 3 illustrates the influence of the Prairie Crossing treatment train on the hydrology of the site. Figure 3 shows simulated hydrographs (using HSPF) for Prairie Crossing and for a more typical development with similar gross density. The hydrographs are for a typical summer. As can be seen from the figure, storm runoff volumes are reduced dramatically, particularly for smaller events. Prairie Crossing produces only minor rises in stormflow during smaller storm events while significantly increasing baseflows between events. Prairie Crossing produces larger increases in stormflow during large events. However, both the maximum daily flow and the storm event runoff volume are substantially reduced relative to a more typical development. Overall, the modeling indicates that Prairie Crossing should produce average annual surface runoff volumes that are 65 percent less than a more typical development.

Table 1 presents the estimated annual pollutant removal effectiveness and runoff volume reduction of the individual components along with the cumulative removal rate of the treatment train. The values in the table assume that sediments, nitrogen, phosphorous, and metals that settle in the swales and prairies are removed from the system. Phosphorous and nitrogen that settle within the

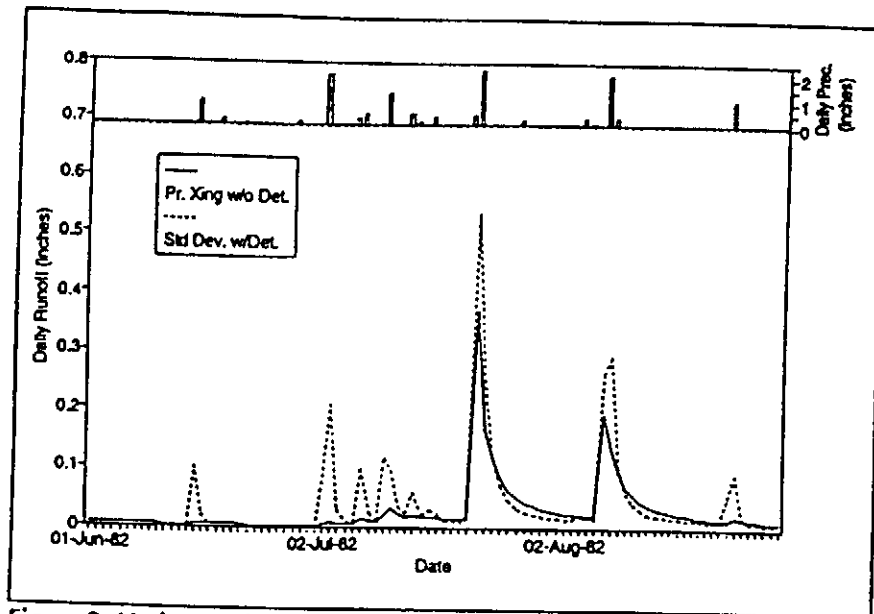


Figure 3. Hydrographs illustrating difference in expected runoff response between Prairie Crossing development and standard development of similar gross density. Prairie Crossing produces a more natural hydrograph with lower peak flows and higher baseflows relative to the hydrograph from the typical development. Even without detention, Prairie Crossing produces lower peak daily runoff rates and substantially lower event runoff volumes than standard developments with detention. The effect is particularly dramatic for smaller events and for events occurring after dry periods.

wetlands and lake are assumed to remain available to the nutrient cycle and not removed from the system. The table shows that only the swales and prairie filters reduce runoff volumes to any significant degree. Because of both settling and the significant runoff volume reduction, the prairie is expected to be quite effective in removing all of the constituents. The wetland and lake are expected to be quite effective in removing solids. However, because of nutrient cycling that occurs within these types of waterbodies, the expected removal rates for nutrients (particularly phosphorous) are not expected to be high.

Table 2 shows the percent of the total site load leaving each of the treatment train components. The table shows that most of the constituents are expected to accumulate in the prairie, where they will be incorporated into the soil and thereby present little concern. The table also shows that only a small fraction of the total site load will enter or accumulate in the lake, significantly enhancing its ability to support recreational and aquatic life uses.

Table 1: Estimated Effectiveness of Individual Treatment Train Components

Constituent	Percent Reduction				
	Swales	Prairies	Wetlands	Lake	Total
Surface Runoff Volume ¹	20%	55%	0	0	65%
Total Suspended Solids ²	25%	80%	50%	80%	98%
Total Nitrogen	20% ³	60% ³	25% ⁴	40% ⁴	85%
Total Phosphorous	20% ³	70% ³	10% ⁴	20% ⁴	85%
Metals ³	25%	75%	35%	60%	95%

¹ Based on HSPF modeling

² Based on removal rates suggested in "Fundamentals of Urban Runoff Management" (Horner et al., 1994) and "Controlling Urban Runoff" (Schueler, 1987) for Swale, Wetland and Lake. Work by Tollner (1975) on filter strips used for Prairie.

³ Assumes that 25% of total nitrogen, 50% of total phosphorous, and 75% of metals are settleable and removed at same rate as total suspended solids and that soluble fractions are removed at same rate as surface runoff volume.

⁴ Based on Moshiri (1993)

Table 2: Percent of Site Runoff Volume and Pollutant Load Leaving Treatment Train Components

Constituent	Percent Leaving Treatment Train Component ¹			
	Swales	Prairies	Wetlands	Lake
Surface Runoff Volume	80%	35%	35%	35%
Total Suspended Solids	75%	15%	8%	2%
Total Nitrogen	80%	30%	25%	15%
Total Phosphorous	80%	25%	20%	15%
Metals	75%	20%	10%	5%

¹ Based on removal rates in Table 1.

Water Quality Improvement Through Source Management

In addition to the stormwater treatment train system in the Prairie Crossing project, the stormwater runoff quality will be enhanced through reduction strategies to manage the sources of pollutants. The project has many design features that specifically target enhancement opportunities with a focus on water quality. Key design features include the following:

- 1) Over 60 percent of the lake shorelines have very shallow water entry angles and a littoral vegetation zone. This will offer protection to shorelines and reduce shoreline destabilization from water-wave action and burrowing mammals; both of which contribute to in-lake sediment loading.
- 2) A strict development covenant and "guidebook" for "Living with Nature" articulate management policies governing open space and developed lots, the lake environment, roadways, and other aspects of the development. Example requirements include:
 - a) use of organic and osmocote slow release fertilizers applied twice per year on residential lawns at the most appropriate time for immediate assimilation by the cool season lawn grasses,
 - b) community composting facility associated with a community supported garden and agricultural programs will alleviate fly-dumping of landscape wastes, and
 - c) landscaping plans for residential yards which include extensive use of native wildflower plantings and other low maintenance vegetation systems.

- 3) Educational opportunities for residents to learn about the native landscapes, to infuse homeowners with a sense of place, encourage their support of environmentally-friendly living and stewardship, and to instill a self-policing system of covenant enforcement.
- 4) Employment of an environmental director to oversee all activities, to work closely with homeowners, to understand alternatives, and to implement land management.

Conclusions

The Prairie Crossing development is unique in northeastern Illinois and probably most other parts of the country. Although it utilizes concepts (namely cluster development and stormwater best management practices) that are not unique, it combines them into a management system that minimizes the need for stormwater structures, enhances the living environment, and minimizes the negative impacts of urban development. This not only reduces costs to the developer, but it also reduces maintenance costs such as catch basin cleaning and lake dredging for the municipality.

The created prairies will provide habitat heterogeneity and opportunities for a variety of plant species and communities to exist. They will also result in substantial reduction in stormwater runoff volumes and water quality enhancement. Based on published BMP effectiveness information and hydrologic modeling, the Prairie Crossing development is expected to reduce surface runoff volumes by 65 percent and reduce solids, nutrients, and heavy metals loads by 85 percent to nearly 100 percent. Source controls will minimize

the impacts of the development even further. These removal rates will be verified, contingent upon funding, through site monitoring and further modeling calibrated to collected site data.

While most developments rely on detention basins to provide pollutant removal, much of the removal for the Prairie Crossing development is expected to occur within the prairie. This will significantly enhance the lake/detention basin's ability to serve as a recreational and aesthetic amenity and reduce lake maintenance.

Acknowledgements

A project of this complexity has involved a team of dedicated and hard working individuals without which this project would not have been possible. The original vision by conservationists Mr. and Mrs. Gaylord and Dorothy Donneley was translated into plans by Prairie Holdings Corporation under the leadership of George and Vicky Ranney. Consultants included William Johnson and The Lannert Group, with engineers at P & D Technologies, ecologists with Applied Ecological Services, Inc., legal counsel from Mayer, Brown, and Platt (and other firms), as well as assistance from The Conservation Fund (steward of conservation easements), Frank Martin (President of Shaw Homes, the development manager), and a multitude of valued and appreciated team participants have contributed to this project.

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APA's Growing SmartSM Project and the Nuts and Bolts of Smart Growth
Cornhusker Hotel
Lincoln, Nebraska
August 11, 1999

by Stuart Meck, AICP
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American Planning Association
Chicago, Illinois

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- I. Why is there interest in “smart growth”—are we in the middle of a revolution?**
 - II. The four phases of planning statute development in the U.S.**
 - III. What is Growing SmartSM?**
 - IV. What is the philosophy of Growing SmartSM?**
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November 1998

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Questions and Answers on the American Planning Association's Growing SmartSM Project

Q: What is Growing SmartSM ?

A: Growing SmartSM is the American Planning Association's (APA) multiyear project to draft the next generation of model planning and zoning legislation for the U.S.

Q: Why did APA undertake this project?

A: Our tools are outdated for the times we live in. We need better statutory models that meet contemporary needs. Most planning statutes in the United States descend from two model acts drafted by an advisory committee of the U.S. Department of Commerce in the 1920s, under Commerce Secretary (and later President) Herbert Hoover. In the 1920s, government was simpler and planning was a local activity, not something that was expected of all levels of government. Now the intergovernmental dimension is more complex.

In some communities and regions since the 1970s, high rates of growth have prompted concern over cost of services, adverse impacts on the environment and quality of life, and the balance between jobs and housing. A number of states recognized these concerns and state legislatures responded. Some states now take an active role in managing this intergovernmental dimension to ensure uniformity, fairness and the advancement of state interests.

At the end of the twentieth century, we also have a different view of land. People no longer believe, as they did in the nineteenth century, that land is merely a commodity to be bought and sold. We now also regard land as resource. Where we once encouraged the filling in and development of swamps, we now regard those same wetlands to be a vital part of nature's system of flood control and important for wildlife and their habitats. Land has qualities that should be protected for the benefit of future generations. We see vacant, developable land as having competing social values--it can be used for the construction of affordable housing or for the continuation of agriculture.

People expect more of planning now. In the 1920s, community plans tended to be prepared by consultants working for elite groups who sought little broad-based public support or involvement. What opportunities there were for citizen participation were rudimentary--a single public hearing after the major planning decisions had already been made. As a consequence, such plans were not often implemented. Although many planning statutes are silent on the tools and techniques of participation, citizens now expect to be engaged in community planning processes, and, when they participate, they expect to see results.

There is also a more challenging legal environment for planning. Land-use controls are being employed to solve or prevent environmental problems, maintain open space, exact public improvements for schools and roads, and preserve agricultural land. The line between protecting the public from nuisances--the focus of the 1920s--and securing public benefits has blurred over the past 70 years. In response, courts have begun to require government to compensate land owners for regulations that result in either a permanent or temporary taking of private property, that go "too far" in pushing the envelope in protecting the public health, safety, and welfare. Thus, the planning basis for our development decisions becomes even more significant.

Q: Can states undertake reform by themselves?

A: It is hard to undertake statutory reform without understanding what has been tried and what works. When states decide to evaluate their planning statutes, they find that the process is complex, time-consuming, and expensive. Often they can only focus on two or three states for comparison. The information they need to undertake the evaluation is hard to assemble.

Q: Where did the idea for Growing SmartSM originate?

A: APA is nonprofit organization of some 30,000 members--professional planners, elected and appointed officials, and citizens interested in sound planning--and has chapters in 46 states. The idea for the project originated in 1991 with the APA Chapter Presidents Council. The council believed that APA should provide leadership in the reform of the nation's planning statutes to meet the needs of the next century. The Growing SmartSM project is intended to establish and maintain an ongoing capacity within APA to help key decision makers in each of the states modernize their planning statutes.

Q: What are the main products of the project?

A: There are two main products: (1) the Growing SmartSM *Legislative Guidebook* that contains model planning statutes with commentary; and (2) a national statute clearinghouse for state legislative materials dealing with planning and management of change.

Q: Who is the audience for Growing SmartSM?

A: The main audience is officials in the executive and legislative branches of state government--the governor and his or her staff, staff of key legislative committees, state planning offices, departments of community affairs, and other state offices with missions related to housing, economic development, transportation, community revitalization, and the environment. The audience also includes public officials at the local and regional levels--in cities, towns, counties, and regional agencies such as councils of government and regional planning commissions. In addition the project hopes to reach those who are affected by planning decisions and who have an interest in how the statutes are revised--local planners, builders, developers, real estate and design professionals, housing advocates, environmentalists, highway and transit specialists, and citizens.

Q: What's in the *Legislative Guidebook*?

A: The *Guidebook* contains model statutes for planning and the management of change. Commentary provides background information, describes pros and cons of legislative alternatives, and makes suggestions concerning implementation. The *Guidebook* also directs the reader to relevant state and federal statutes,

books, reports, and articles. When complete, the *Guidebook* will contain a projected 15 chapters.

Model statutes in the Phases I and II interim edition of the *Guidebook*, released in September 1998, address state, regional, and local planning and intergovernmental tax equity issues stemming from reliance on the property tax. The *Guidebook* also includes model statutes and executive orders for initiating statutory reform at the state level, as well as language on statements of purpose and standard definitions. Many of the model acts are based on existing, successful state statutes.

The state planning chapter contains model legislation for establishing state planning agencies and describes various types of state plans as well as procedures for adopting them. Some of the state plans are simply intended as vehicles to formulate policy or a "vision" for the state. Others have regulatory implications. For example, the *Guidebook* proposes several different model statutes to ensure the construction of affordable housing and removal of regulatory barriers to it. There is also an innovative statute for a state telecommunications and information technology plan. The chapter concludes with a state capital budgeting statute.

The regional planning chapter is similar, proposing different organizational structures for regional agencies and descriptions of regional plans, including those for housing, regional infrastructure, and transportation. It proposes an optional regional or county-level process to establish urban growth areas to ensure more compact urban development, protection of agricultural land, and better coordination of regional infrastructure. The chapter contains a variety of implementation tools, including agreements between a regional planning agency, local governments, and urban service providers to carry out measures in regional plans as well as procedures for review of major capital improvements of regional significance.

A chapter on state-level land-use controls advances an innovative procedure for siting controversial state facilities. In addition, the chapter contains procedures for reviewing developments of regional impact, large-scale projects whose impacts extend beyond the boundaries of a local government. There is also a model for designating areas of critical state concern that are crucial to the environmental health of the state or represent other critical resources.

The local planning chapter offers models for local comprehensive planning and neighborhood planning. Highlights include statutes on the establishment of local planning commissions and local planning agencies, the contents and preparation of local comprehensive plans and neighborhood plans, citizen participation, land market monitoring, transit-oriented development plans, transportation corridor mapping, benchmarking, local capital improvement programming, and state review and approval of local and regional comprehensive plans.

A chapter on integrating state environmental quality acts into local planning includes model legislation that authorizes an environmental evaluation of several elements of a local comprehensive plan to determine the plan's effects on the environment.

The chapter on tax-equity devices includes a model regional tax-base sharing statute, based on a model from Minnesota for the Twin Cities area, by which a portion of the growth in the commercial, industrial, and high-value residential property tax base is shared among local governments in a metropolitan area. It also contains a model statute permitting voluntary intergovernmental agreements among two or more units of local government to create a joint economic development zone.

Q: Must every state use the same model statutes?

A: No. If one thing is clear, there is no "one-size-fits-all" with respect to planning statutes. As APA began this research, it quickly became apparent that states were increasingly shaping their legislation to address problems that were unique to their circumstances. Consequently, the models in the *Guidebook* are drafted to give users alternative approaches.

Q: What about the clearinghouse? And how do I get the *Legislative Guidebook*?

A: Virtually all the Growing SmartSM material is on APA's World Wide Web site: <http://www.planning.org/plnginfo/growsmar/gindex.html>. This includes a downloadable version of the current edition of the *Guidebook* using an Adobe Acrobat reader (instructions for downloading Adobe Acrobat are also on the web site), summaries of the planning statutes for all 50 states, and two annotated bibliographies on statutory reform. APA publishes a project newsletter, also at the Web site, that is aimed at people interested in statutory reform. In addition, most of the background materials that APA has collected--state studies on statutory reform, monographs on existing planning programs, commentaries--are available from APA, through its Planning Advisory Service, either on loan or at no cost (see address, and telephone, fax, and E-mail numbers below). You may also order a hard copy of the *Guidebook* from APA's Planners Book Service in Chicago online at www.planning.org/bookservice/default.asp, or 312-786-6344 (\$32). Also available are two sets of working papers for the project, as Planning Advisory Service Reports (\$24 and \$28).

Q: Who funded the project?

A: The project is funded by the Henry M. Jackson Foundation of Seattle, the U.S. Department of Housing and Urban Development, the Annie E. Casey Foundation of Baltimore, the Siemens Corporation, the U.S. Environmental Protection Agency, the Federal Emergency Management Agency, the Federal Highway Administration, the Federal Transit Administration, the U.S. Department of Agriculture Rural Economic and Community Development Administration, and APA.

Q: How do I find out more?

A: Contact APA at 122 South Michigan Avenue, Suite 1600, Chicago, IL 60603; 312-431-9100 (tel.), 312-431-9985 (fax), growingsmart@planning.org (E-mail).

What is "Smart Growth"?

"Smart growth" means planning, regulatory, and development practices and techniques founded upon and promoting the following principles:

- using land resources more efficiently through compact building forms, infill development, and moderation in street and parking standards in order to lessen land consumption and preserve natural resources;
- supporting the location of stores, offices, residences, schools, recreational spaces, and other public facilities within walking distance of each other in compact neighborhoods that are designed to provide alternate opportunities for easier movement and interaction;
- providing a variety of housing choices, so that the young and old, single persons and families, and those of varying economic ability may find places to live;
- supporting walking, cycling, and transit as attractive alternatives to driving and lowering traffic speeds in neighborhoods;
- connecting infrastructure and development decisions to minimize future costs by creating neighborhoods where more people use existing services and facilities, and by integrating development and land use with transit routes and stations; and
- improving the development review process and development standards so that developers are encouraged to apply the principles stated above.



Strategies and Techniques for Smart Growth

from *The Principles of Smart Development*, Planning Advisory Service Report No. 479 (Chicago: American Planning Association, 1998), available from the APA Planners Book Service, tel. 312-786-6344, \$32.

STRATEGY	OBSTACLE	SOLUTION
1. Efficient Use of Land Resources		
1.1 Small-lot infill development	Excessive lot-area dimensions	Revise setback requirements; minimum lot sizes
1.2 Infill development on large lots	Inflexible subdivision and lot-area requirements	Average lot size for whole development; allow flexibility to preserve natural features
1.3 Coordinated development	Coordinated development not addressed	Specific development plans; master plans
1.4 Better use of deep lots	Excessive frontage and multiple access requirements	Midblock lanes; interior block cluster development; flag lots
1.5 Less land for streets	Excessive street design standards	Adopt "skinny" street standards
1.6 More efficient use of parking areas	Excessive parking requirements	Reduce minimum parking ratios; set parking ratio maximums; acknowledge on-street parking; encourage shared parking
2. Full Use of Urban Services		
2.1 Achieving planned densities	Underbuilding; no support for density goals	Minimum density standards
2.2 Attached units	Lot sizes not in proportion to unit sizes	Reduce lot-size requirements; allow single-family attached in all residential zones
2.3 Attached units	Lot-area dimension requirements (excessive side setbacks)	Revise setback requirements
2.4 Accessory units	Excessive minimum unit size; density maximums too low	Allow accessory units
3. Mixed Use		
3.1 Mixed-use buildings	Single-use zoning; separation of uses	Allow home occupations and live/work units; density bonus for mixed-use commercial/residential buildings
3.2 Mixed-use neighborhoods	Single-use zoning; separation of uses	Limited commercial in residential zones; allow multifamily residential in commercial zones; limited retail in industrial zones
3.3 Healthy commercial districts	Separation of uses; proximity	Community shopping centers with street connectivity; main street districts
4. Transportation Options		
4.1 Multimodal streets	Street design standards overemphasize autos	Revise street standards; promote "skinny" streets
4.2 Transit, bike, and pedestrian connectivity	Physical barriers or out-of-direction travel	Cul-de-sac and block-length maximums; internal connectivity standards; sidewalk requirements
4.3 Transit-supportive development	Transit-supportive development not addressed	Mandate transit-oriented development along transit corridor
5. Detailed, Human-Scale Design		
5.1 Compatibly designed buildings	Too abrupt transitions between zones	Density transitioning; midblock zoning district lines; building height limits
5.2 Compatibly designed buildings	No design guidelines for new buildings	Incorporate compatibility guidelines for new infill construction
5.3 Pedestrian-friendly streetscapes (commercial)	Street standards emphasize cars; design discourages walking	Building orientation; parking lot placement; allow shared access; 50%/80% frontage rule; etc.
5.4 Pedestrian-friendly streetscapes (residential)	Street standards emphasize cars; design discourages walking	Require sidewalks; limit setbacks; garage placement; lighting; utility placement; etc.
5.5 Quality architectural design	No incentive to provide amenities	Density bonuses for amenities
6. Implementation		
6.1 Examining the development review process	Onerous procedures for variances, conditional uses	Allow administrative approval for minor adjustments
6.2 Examining the Planned Unit Development (PUD) process	Onerous PUD requirements	Improved PUD regulations
6.3 Flexibility in the design review process	Discretionary design review process; vague standards	Dual-track design review process



Center for Sustainable Agricultural Systems

Institute of Agriculture and Natural Resources

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July-August 1998

Centers Propose Education on Conservation Buffers: The Rural/Urban Interface

Conservation buffers of woody perennials and other plantings, such as windbreaks and riparian filter strips, have long been recognized as important for livestock, for crop production, and for attenuating the impacts of weather. Tree windbreaks are an important component of the Integrated Farm at the University of Nebraska-Lincoln Agricultural Research and Development Center. Several public agencies have long promoted these plantings for conservation purposes, and substantial funding is available from federal and local sources, such as the Nebraska Resource Districts. Yet conservation buffers continue to be an underexploited resource for Nebraska farmers.

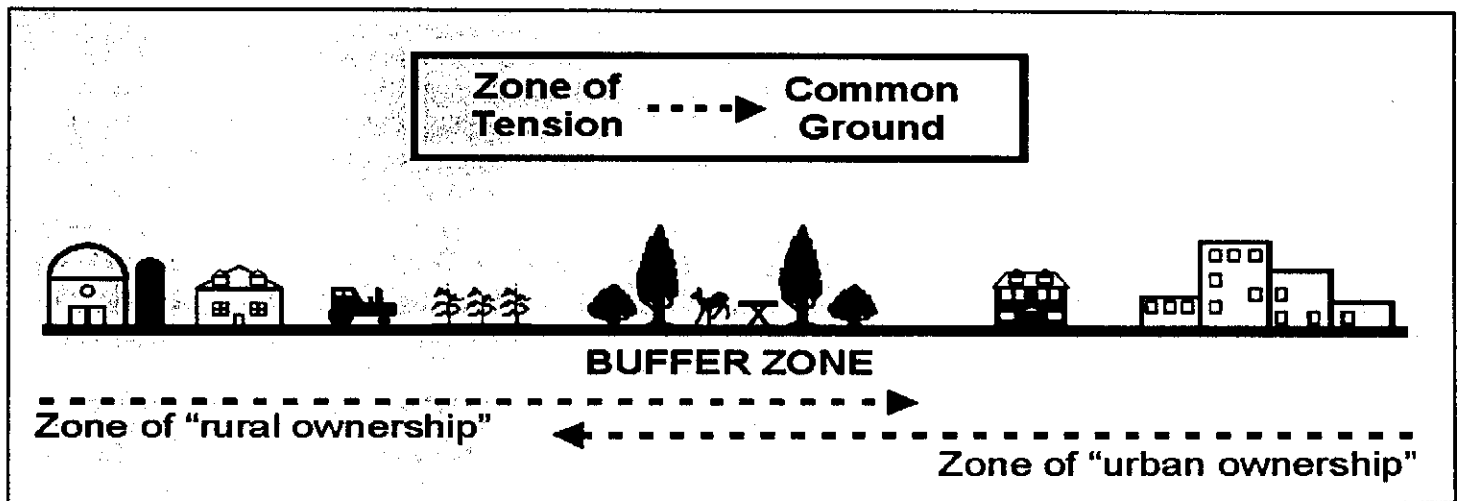
A proposal submitted in March to USDA by CSAS brings together specialists from UNL, the National Agroforestry Center (Forest Service and Natural Resources Conservation Service) in Lincoln and the North Central Regional Center for Rural Development at Iowa State University to focus on the economic and social constraints to adoption of conservation buffers. This proposal has letters of support from 10 organizations including the Nebraska Sustainable Agriculture Society, the Conservation Tillage Information Center, and North Central Region SARE. The

\$1.9 million proposal (pending as of this writing) uses a multi-partnered, integrated approach that includes research to determine the factors that impede adoption of conservation buffers as well as an education campaign using farmer and landowner workshops, direct mailings, interactive television programs, and other methods of reaching private landowners with information about the benefits of conservation buffers.

Challenges at the Rural/Urban Interface

A valuable extension of the application of conservation buffers in agriculture is their use at the boundary between agriculture and city dwellers – the rural/urban interface. People in urban areas are among the most important clients for products from agriculture, yet there is a growing distance between urban and agricultural sectors. The increasing concentration of U.S. farming on basic crop commodities and the dominance of processing and advertising from vertically integrated major food companies has accentuated this distance from field to household. A Nebraska farmer should not be surprised to learn that people living across the fence have little idea how these fields of basic grains

(continued on page 5)



Concept of shared ownership of a rural/urban buffer system



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Buffers (continued)

eventually make their way to the table. Repeated applications of chemical fertilizers and pesticides, use of large field equipment producing noise and dust, and limited or no jobs in agriculture make farms a perceived liability to their urban neighbors rather than a source of pride and a viable part of the local economy. On the flip side, the environmental impact that urbanization has on its agricultural neighbors and the threats and pressures of urban-driven agricultural policies and regulations create a *zone of tension* where these two land uses meet.

Woody conservation buffers are seen as one way to buffer or separate the activities of the farm and town. Such a band-aid approach of using narrow bands of plantings of windbreaks or riparian buffer strips can potentially screen off the farms and some of the dust, noise, and chemical drift. These buffers can also prevent some encroachment by snowmobiles, dogs, and garbage that moves from homes onto farmland. This function is analogous to the tall barriers built along some interstate highways that course through large cities. However, this use of buffers as screens or barriers does little to solve the greater challenge at hand and may reinforce an "us versus them" mentality. This approach certainly does not bring urban people closer to agriculture, nor does it capitalize on the fuller suite of benefits of buffers (e.g., recreational opportunities such as birdwatching, hiking and biking; wildlife habitat; aesthetics; landscape diversity) that can be shared by farm and town folk alike.

From Tension Zone to Common Ground

Rather than promoting buffers as a means to *separate* the town and the farm at this interface, we should reconceptualize this boundary as an area to create and enhance the interaction between farms and communities. The "Working Trees" concept coined by the National Agroforestry Center could be extended to a buffer system that works for people on both sides of the interface area. These multi-use buffer zones can be areas of recreational and aesthetic enjoyment that are otherwise unavailable in the immediate vicinity. They can serve as zones for education about agriculture, food, and protection of natural resources. Buffers could potentially provide economic opportunities for people on both sides either through designs that enhance specialty crop production, incorporation of plant materials for craft and floral activities, or promotion of recreational activities. Further, they could serve as a clear delineation of activities – a boundary beyond which urban expansion should not go, and where natural resources valued by both parties are protected and showcased.

Whether a buffer system is legally in public or private hands, it should be one that is designed to incorporate a

(continued on page 6)

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Buffers (continued)

shared vision of the two groups, thereby effectively changing it from a *tension zone* to one of *common ground*. The mere exercise of joint planning for this small but critical piece of land would provide a focused forum in which to initiate communication between these two groups. The mentality of a *shared ownership/shared responsibility* should foster care and concern for the area which ultimately determines the sustainability of this area. Such win-win solutions as "Working Trees for the Rural/Urban Interface" are appropriate for a coming century when land will be more scarce, and we face increasing pressures to find ways to more wisely use these resources to benefit the people and the environment.

Submitted by Charles Francis and Michele Schoenberger

The Center for Sustainable Agricultural Systems bimonthly newsletter is currently available free in hard copy to U.S. addresses. Current and back issues, along with other sustainable agriculture information are also available on our Web page:

<http://ianrwww.unl.edu/ianr/csas/>

For comments or questions, or to be added to the mailing list for hard copy, contact the editor at the masthead address, or e-mail csas001@unlvm.unl.edu.

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Community Strategies for Preserving Farms and Farmland

Michael Pressman
1000 Friends of Minnesota

A local food system requires local farmland. Community supported agriculture, U-pick operations, and farmers that sell direct to customers through farmers' markets and other means do best when located in proximity to their customers. However, land near towns and cities is often under pressure for conversion to housing and other development, and agriculture cannot compete for land at development prices.

As sprawling development patterns continue to overtake our countryside, communities throughout the country are working to create an alternative future that recognizes natural resources as a key part of a healthy community. The Green Corridor Project is an innovative, community-based approach to protecting farmland and natural areas in two rapidly developing Minnesota counties east of the Twin Cities. Four incentive-based tools will be the primary mechanisms to create the Green Corridor: donated conservation easements, Purchased Development Rights (PDR), Transferred Development Rights (TDR), and land acquisition.

Michael Pressman is Director of Planning for 1000 Friends of Minnesota, Minnesota's only statewide growth management organization. He holds a Masters Degree in Regional Planning from the University of Pennsylvania. Michael has been involved in numerous land protection planning projects from the site scale to the landscape scale.

The following Fact Sheets describe the Green Corridor Project and the main land protection tools used by the project.

Further Information

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American Farmland Trust

Farmland Information Library: <http://farm.fic.niu.edu/fic/home.html>
Homepage: <http://www.farmland.org>

GREEN CORRIDOR PROJECT

Proposed Green Corridor Opportunity Areas

What is the purpose of the Green Corridor Project?

The Green Corridor Project is dedicated to helping Chisago and Washington counties' residents keep the beautiful countryside, farmland and special natural areas that make them great places to live.

What is a 'green corridor'?

Green corridors are farmland, natural areas, environmentally sensitive lands, and scenic areas that are linked together throughout the community. The Green Corridor will link these lands with already protected public and private lands in Chisago and Washington counties.

What will happen in the Green Corridor?

It is proposed that owners of lands in the Green Corridor would be eligible for incentive-based land conservation tools that they can use in considering the future of their property. The Green Corridor Project will work closely with local government and land owners to selectively apply the following four land protection tools to lands located in the designated green corridor: donated conservation easements, purchased development rights (PDR), transferred development rights (TDR), and land acquisition. Lands to be protected must meet the criteria for each tool and **must be owned by landowners interested in participating in the programs.**

How were the Green Corridor Opportunity Areas determined?

The Green Corridor Project determined the criteria of lands that would meet each of the main four program objectives: protect agricultural land, preserve natural habitat diversity, protect environmentally sensitive areas, and preserve scenic areas. Data were mapped for each of the criteria to guide the mapping work. At public forums in the fall of 1997, more than 250 citizens provided information on their conservation priorities and lands that they would like to see protected. A Green Corridor Advisory Team, of more than a dozen people with specialized technical expertise, used all of this information to map three corridor options of lands that best met all of the program objectives.

During the fall of 1998, more than 260 citizens attended 6 public forums and another 60 local government officials and staff attended special local government meetings to review the three options. Input from these meetings and selected community plans were reviewed by the Green Corridor Advisory Team to help create the Proposed Green Corridor Opportunity Areas.

What will happen next?

The Green Corridor Project will be scheduling meetings with townships and cities in the Proposed Corridors early in 1999 to review the proposed corridors. The collaborative team is providing technical and limited financial assistance to communities and watershed districts interested in implementing conservation programs. A roundtable of community officials and staff, land owners, real estate interests, conservationists, and others is exploring development of proposals for implementing Purchase of Development Rights (PDR) and Transfer of Development Rights (TDR) programs. The Minnesota Land Trust is working with landowners interested in donated conservation easements.

If you or your community is interested in helping to implement the Green Corridor, please contact 1000 Friends of Minnesota or any of the project collaborators.

Funding for this project approved by the Minnesota Legislature: ML1997, Chapter 216, Section 15, subdivision 9(d) as recommended by the Legislative Commission on Minnesota Resources, from the Environmental Trust Fund

The Green Corridor Project

Fact Sheet #1

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The Green Corridor Project... Keeping Open Spaces for Tomorrow

The Green Corridor Project is dedicated to helping the residents of Washington and Chisago Counties keep the beautiful countryside, farmland, and special natural areas that make this a great place to live.

Green corridors are areas of farmland, natural areas, scenic areas and other open spaces that are linked together throughout the community. Green Corridors help communities keep the landscape they love while accommodating growth. This is achieved through incentive-based programs that provide interested landowners with new options.

Open Space: Save It or Say Goodbye

Our communities are growing very fast. We can continue to grow and thrive, but we need to plan proactively for where we want growth to go. If we don't, we can say goodbye to the landscape we love.

- Every day in Minnesota, an area the size of the Mall of America is paved over.
- Minnesota is the fastest growing state in the upper Midwest.
- The 13-county Twin Cities area is the fastest growing metropolitan region from the northern plains to the eastern seaboard.
- This metropolitan area also is one of the most sprawling (land and resource consuming) of the top 25 metro regions in the country.
- Washington County is one of the fastest growing counties in the state and the country.
- By June 1994, Chisago County had already passed its projected population growth for the year 2000 by 41 percent.

Sprawl Costs Us All

Property taxes continue to increase in Minnesota, and more and more communities are finding that explosive, sprawling growth is part of the problem.

Growth can expand a community's tax base, but it also increases demand for costly roads, schools, police, fire, sewer and water lines and other services for which the community must pay. There is mounting evidence that inefficient, sprawling growth is actually a net drain on community tax coffers.

- **Houses Cost More than Farms:** A 1994 analysis of three Minnesota cities shows that residential development costs more tax dollars than it contributes in tax revenues. For every \$1 paid in taxes, farmland demands \$.47 in services, while residential development demands \$1.04 in services.

	Tax revenues	Cost of services demanded
Farmland	\$1.00	\$.47
Residential development	\$1.00	\$1.04

- **Sprawl Costs Taxpayers More:** Economic research done in Minnesota shows that compact developments save taxpayer dollars because services can be provided more efficiently. In Wright County, when service costs of residential development were compared with the revenue they generated, low density residential development had a net deficit which was more than four times that of high density residential development.

Green Corridors Protect More than Open Space

Around the Midwest and throughout the country, green corridors have worked to help communities accommodate fast growth and still keep the landscapes they love. Green corridors provide connections between communities, between already protected lands, and between people and the land. Green corridors protect our green infrastructure, providing a legacy for future generations.

Communities in places from Massachusetts and Michigan to Colorado and Oregon have used green corridors to improve the appeal of neighborhoods and support their long-term tax base. Economic studies around the country have demonstrated proximity to open spaces, agricultural land, and parks boosts property values and enhances the appeal of neighborhoods.

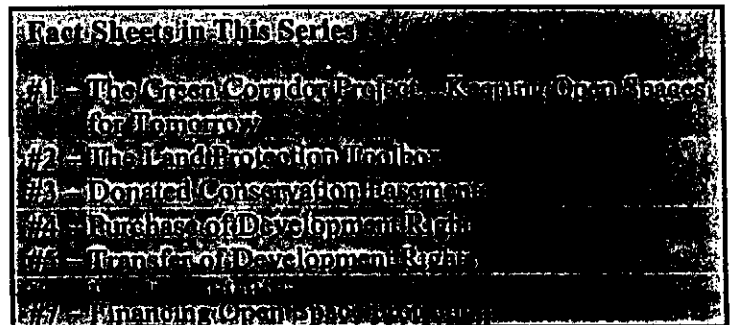
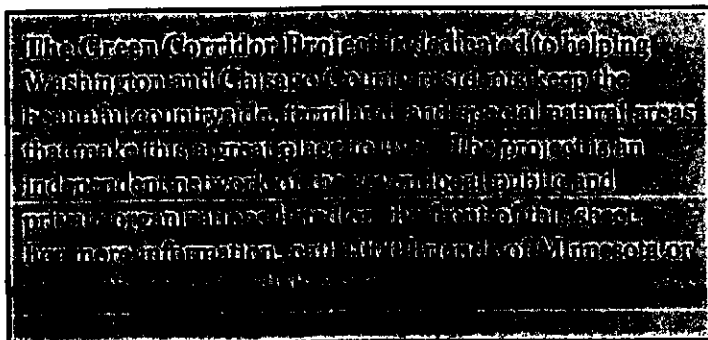
- A study in Boulder, Colorado found that properties immediately next to green corridors had market values 32 percent more on average than similar properties without green corridors nearby.
- In Minnesota, 61 percent of property owners living next to the Luce Line Trail noted an increase in their property values. Realtors confirm that proximity to the trail enhances the appeal and selling value of property.
- An Oregon study found that urban land next to agricultural land was worth \$1,200 more per acre than similar land 1,000 feet away.

Tools to Keep Open Spaces

The Green Corridor Project will help people keep the landscape we love using four incentive-based tools.

- *Donated Conservation Easements*
- *Purchased Development Rights (PDR)*
- *Transferred Development Rights (TDR)*
- *Land Acquisition*

For more information on these tools, refer to the other fact sheets in this series.



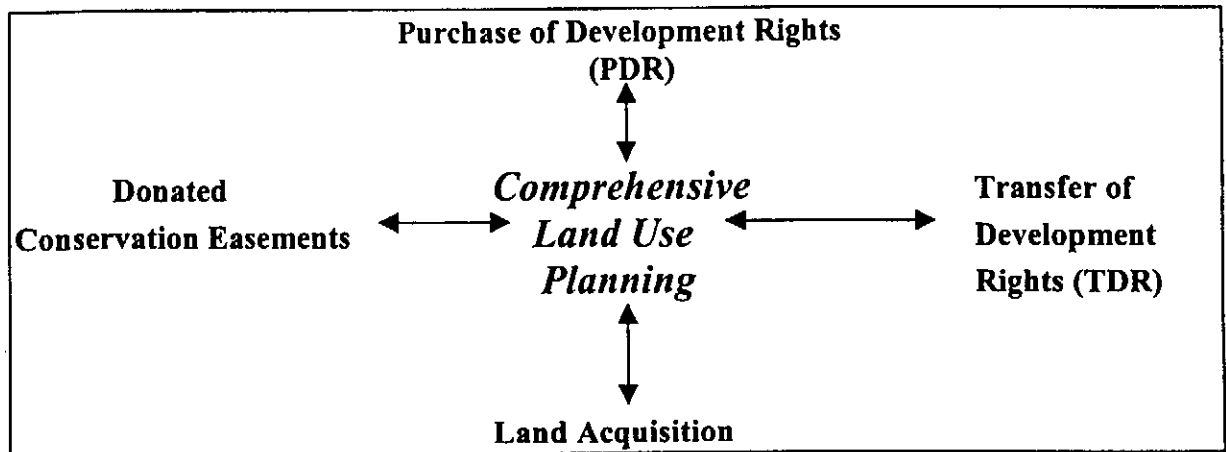
Statistics for this fact sheet developed from: MN Dept. of Agriculture, American Farmland Trust, National Park Service, US Dept. of Agriculture, MN Dept. of Trade and Economic Development, US Census Bureau, Metropolitan Council, & MN Demographer's Office.

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The Land Protection Toolbox

Communities that are concerned about the long-term impacts of development pressures on their farmland and natural areas can look at a number of options. While each of these tools can play a valuable role in maintaining a critical mass of open space and agriculture, no silver bullets can meet all of a community's needs. The most effective strategy is to use the combination of tools that make the most sense for your own city, county, or township.

The Green Corridor Collaborative can help individual communities in Chisago and Washington counties as they examine the toolbox. We can provide technical assistance and references to other communities who have successfully applied these tools.



Donated Conservation Easements are voluntary legal agreements between a landowner and a land trust or local government agency that allow landowners to permanently limit or prohibit development on their property. Conservation easements run with the title so that all future owners of the land are bound by the original agreement.

Purchased Development Rights (PDR) are voluntary legal agreements that allow owners of land meeting certain criteria to sell the right to develop their property to local government agencies, state government, or to a nonprofit organization. A conservation easement is then placed on the land. This agreement is recorded on the title to permanently limit the future use of the land to agriculture, forestry, or other open space uses.

Transferred Development Rights (TDR) are enabled by local ordinances that create *sending areas*, or preservation areas, and *receiving areas* where communities encourage additional growth and development. Landowners in the *sending area* receive *development right credits* which they can sell in exchange for not developing their land. Real estate developers, speculators, or the local unit of government can then purchase the *development right credits* and use them to increase existing or planned densities in *receiving areas*. **Land Acquisition** – is used in select cases when willing landowners want to conserve their land by selling or donating it outright to a public agency or land conservation organization. This mechanism allows the public agency to have full control over a property's future.

The
Green
Corridor
Project

Fact
Sheet #2

► **1000 Acres Safely
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Report**
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► **Countywide
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► **Minnesota
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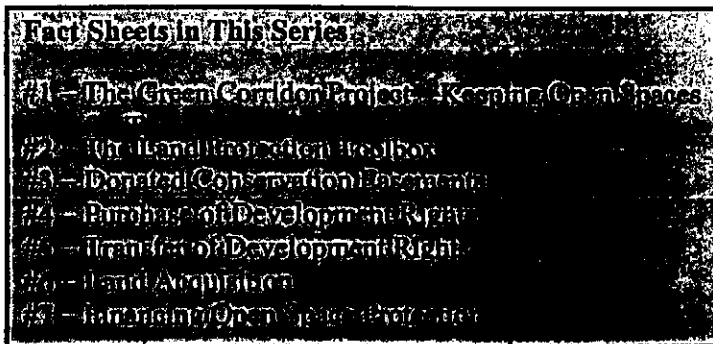
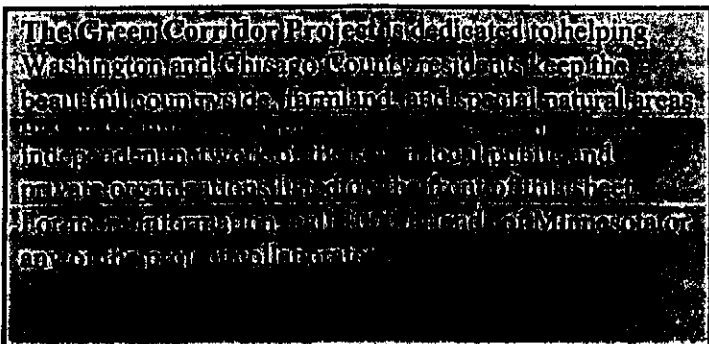
► **The Green
Corridor
Project**
(612) 332-1473

► **Washington
County
Conservation**
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Land Protection Tool	Pro	Con
Donated Conservation Easements	<ul style="list-style-type: none"> • Permanently protects land from development pressures. • Landowners may receive income, estate, and property tax benefits. • No or low cost to local government. • Land remains in private ownership and on the tax rolls. 	<ul style="list-style-type: none"> • Tax incentives may not provide enough compensation for many landowners. • Little local government control over which areas are protected.
Purchase of Development Rights	<ul style="list-style-type: none"> • Permanently protects land from development pressures. • Landowner is paid to protect their land. • Landowners may receive estate and property tax benefits. • Local government can target locations effectively. • Land remains in private ownership and on the tax rolls. 	<ul style="list-style-type: none"> • Can be costly for local unit of government.
Transfer of Development Rights	<ul style="list-style-type: none"> • Permanently protects land from development pressures. • Landowner is paid to protect their land. • Landowners may receive estate and property tax benefits. • Local government can target locations effectively. • Low cost to local unit of government. • Utilizes free market mechanisms. • Land remains in private ownership and on the tax rolls. 	<ul style="list-style-type: none"> • Can be complex to manage. • Receiving area must be willing to accept higher densities. • Most successful programs typically require a strong real estate market.
Land Acquisition	<ul style="list-style-type: none"> • Provides maximum flexibility for local unit of government to determine future use of land. • Financial incentive for landowner. • Local government can target locations effectively. 	<ul style="list-style-type: none"> • Can be costly for local unit of government. • Government takes on the costs and liability of land management.

Comprehensive Land Use Planning – Each of these land protection tools has pros and cons which must be weighed by the local unit of government. To most effectively utilize a combination of these tools, the local unit of government should develop a new comprehensive land use plan, or amend an existing plan, to ascertain its unique needs and apply the most appropriate tools for the situation. Comprehensive plan changes should always be undertaken with a maximum level of citizen participation from throughout the community. Land protection tools can complement effective zoning to carry out the goals of the comprehensive plan.



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The Green Corridor Project Fact Sheet #3

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> Canyonsouth
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> Minnesota Farmland Action
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> Minnesota Land Trust
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> Rural Community Institute
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> The Center for Rural Land
(612) 661-0777

> Minnesota Conservation Council
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Conservation Easements and Tax Benefits for Landowners

What Is a Conservation Easement?

A conservation easement is a legally recorded agreement by which landowners may voluntarily restrict the use of their land. A conservation easement protects important land resources and can be held by a qualified conservation organization (such as the Minnesota Land Trust) or local unit of government. Provided that certain conditions are met, donors of easements may be eligible for income, estate and/or property tax benefits. One condition is that there must be an established, recognizable public benefit, such as protecting rare species, public water supplies, or scenic vistas visible from roads. Public access is **not** a requirement.

Although the duration of a conservation easement can vary depending on the desires of the landowner, tax benefits are available only for perpetual easements. Many land trusts will only accept perpetual easements, since they provide permanent protection by subjecting all future landowners to the same restrictions. Conservation easements are also the principal legal mechanism used to protect land in a Purchase of Development Rights (PDR) or Transfer of Development Rights (TDR) program (see other fact sheets in this series).

What Types of Land Can Be Protected through Conservation Easements?

Any type of undeveloped or sparsely developed property can be protected with a conservation easement. Conservation easements can be used to protect agricultural land, forested land, wildlife areas, wetlands and other scenic or natural lands.

What Effect Does This Agreement Have on My Property Rights?

A landowner who conveys a conservation easement retains all rights to use the land for any purposes that do not interfere with the conservation of the property as stated in the terms of the easement. The landowner retains the title to the property, the right to sell it, the right to restrict public access, and the right to give it to whomever he or she chooses. However, most or all of the rights to develop are restricted or eliminated. The terms of a conservation easement are individually tailored to reflect each landowner's particular needs, situation and property. For example, one landowner may want to prevent any future development. Another may want to retain the right to construct an additional barn or shed. A third landowner may want to reduce, beyond what is allowed by current zoning, the number of homes that may be built on a certain parcel. The easement can be written to apply to the entire property or to only a portion of it.

How Is the Easement Value Determined?

Land ownership can be viewed as owning a variety of separate rights on the property. These rights include, but are not limited to, the right to farm the land, the right to build on the land, and the right to exclude the public. When a conservation easement limits any of these rights, the value of the land is affected. The value is determined by having a 'before' and 'after' appraisal completed by a qualified appraiser who meets IRS requirements. First, the land is appraised in light of its full development potential. Then the land is appraised again, taking into account the easement restrictions which limit some or all of the property's development rights. The difference between these two figures is the value of the easement.

In instances where the easement is donated and qualifies under IRS regulations, this amount also is the value of a charitable contribution which can be taken as an income tax deduction. Appraisal costs are the responsibility of the landowner considering donating a conservation easement.

What are the Tax Benefits of a Donated Conservation Easement?

Federal Income Tax Benefits—Under the IRS code, the donation of a qualified conservation easement may be treated as a charitable contribution. The value of the contribution can be deducted at an amount up to 30 percent of the donor's adjusted gross income in the year of the gift. If the easement's value exceeds 30 percent of the donor's income, the excess can be carried forward and deducted (again, subjected to the 30 percent limit) over the next five years, if needed.

Estate Tax Benefits—Donation of easements, whether during the landowner's life or by bequest, can reduce the value of the land upon which estate taxes are calculated. This can greatly benefit the landowner wishing to transfer land to relatives. The estate tax benefits of a conservation easement can often mean the difference between heirs having to sell property to pay estate taxes or being able to keep the property in the family.

Property Tax Benefits—The conveyance of a conservation easement may reduce a landowner's property taxes. This depends on current zoning and land use, current assessed value, and whether the owner participates in a current-use assessment program like Green Acres or Metropolitan Agricultural Preserves Program. Under Minnesota law, county assessors must take a conservation easement into consideration in establishing the market value of the land subject to the easement. However, existing tax basis, assessed value, and current zoning of each piece of property are important factors in determining the potential benefits of any easement. The exact terms of each individual easement also have a bearing on its effect on property taxes.

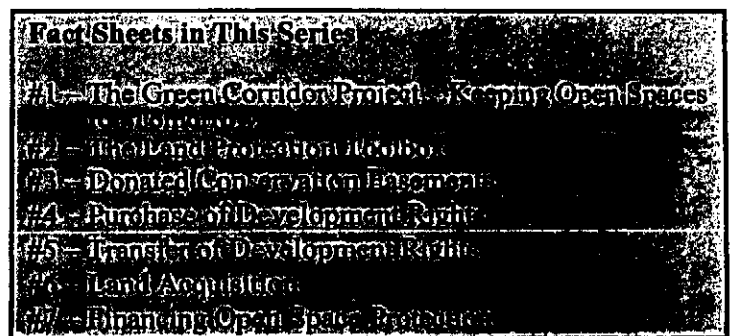
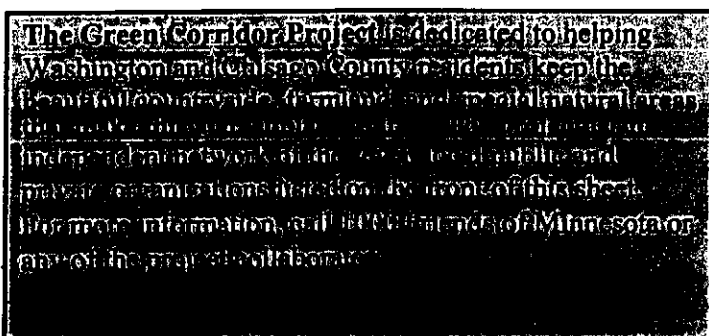
What Criteria Must Be Satisfied?

To be eligible for most of the above tax benefits, the agreement must be entered into with a qualified conservation organization, such as the Minnesota Land Trust, or a local unit of government. In addition, the terms of the easement must be perpetual and they must meet other IRS requirements. The criteria that must be satisfied for the Minnesota Land Trust to accept such a donation are available upon request.

What Rights Does the Easement Holder Have to My Land?

If the Minnesota Land Trust or another qualified organization accepts an easement on your land, it is obligated to oversee and enforce the easement's terms and conditions. For example, an organization has the right to enter and inspect the property (usually once a year) to ensure that the terms of the agreement are being upheld. Except in unusual circumstances, these visits are scheduled with the landowner. The organization does not have the right to use your property, nor does the easement allow public access to the property since it remains privately owned.

To learn more about donated conservation easements, contact the Minnesota Land Trust.



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Purchase of Development Rights

Purchase of Development Rights (PDR) programs have been used successfully in many areas around the nation. They were pioneered in Suffolk County, New York in 1974 and have since been used across the nation to preserve an estimated 400,000 acres of farmland alone. Programs focused on natural areas and other open spaces have protected additional acreage.

Description

Under a PDR program, a landowner voluntarily sells his or her rights to develop a parcel of land to a public agency or a charitable organization interested in natural resource conservation. The landowner retains all other ownership rights attached to the land, and a conservation easement is placed on the land and recorded on the title. The buyer (often a local unit of government) essentially purchases the right to develop the land and retires that right permanently, thereby assuring that development will not occur on that particular property. The landowner is generally compensated for the value of the right to develop the land through the following formula:

General Approach – Appraisal Method

Appraised Value for Development	-	Appraised Value for Agriculture/Conservation	=	Appraised Value of Development Rights
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Considerations

When considering where PDR fits into a community's land conservation plan, one should consider the cost involved in purchasing development rights on a significant amount of land. In areas with high growth pressure, the cost of a PDR program can be high as the difference between development value and conservation value increases. Used strategically, however, a PDR program can be an effective tool to help maximize a community's conservation efforts. Money for PDR programs can be raised through a variety of means, including bonding initiatives, private grants, and various taxation options. Many communities have found matching dollars from state and federal sources. Additional considerations are noted on the back side of this fact sheet.

Where It Is Working

One of the most successful PDR programs in the country is run by the Agriculture Preserve Board of Lancaster County, Pennsylvania. It has preserved over 23,500 acres of farmland since 1981.

Closer to home, Dunn Township, Wisconsin, located near Madison, initiated a PDR program in 1996. In 1997, the Minnesota legislature passed enabling legislation to explicitly allow local units of government to develop and utilize PDR programs.

The Green Corridor Project is working to develop one of Minnesota's first Purchase of Development Rights program.

**The
Green
Corridor
Project**

**Fact
Sheet #4**

1000 Lands of
Minnesota
(651) 222-1000

Land Stewardship
Project
(612) 663-0100

Minnesota
Department of
Natural Resources
(612) 296-1000

Minnesota
Department of
Natural Resources
(612) 296-1000

Minnesota
Department of
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Department of
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Department of
Natural Resources
(612) 296-1000



Selected State and Local PDR Programs

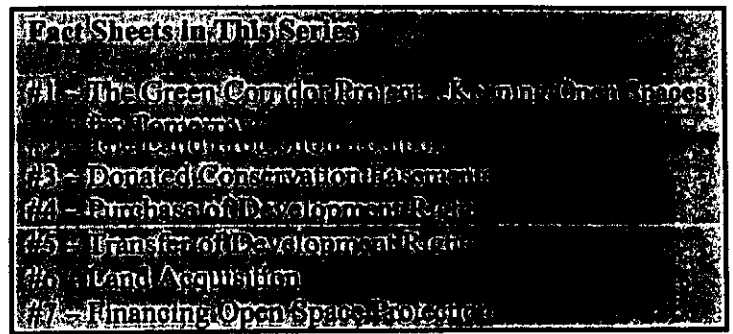
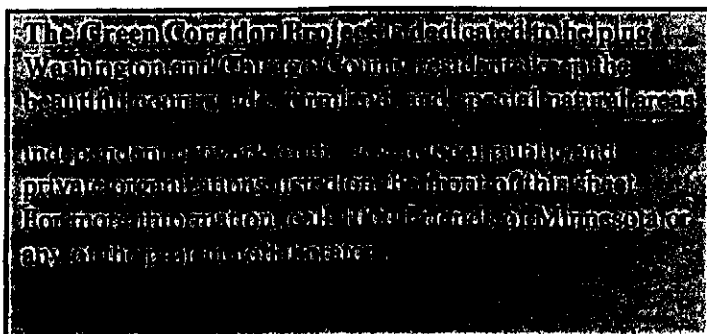
Jurisdiction	Year of Inception	Acres Protected	Farms Protected	Funds Spent to Date	Funding Source
Selected State PDR Programs					
Colorado	1994	1,878	3	\$610,000	A portion of lottery proceeds, FFP
Delaware	1991	15,961	65	\$18,950,000	Appropriations from special capital fund, FFP
Maryland	1977	128,031	884	\$140,637,690 (not including admin costs)	Agricultural transfer tax, portion of real estate transfer tax, FFP
Massachusetts	1977	39,334	430	\$95,000,000	State bonds, FFP
Michigan	1994	79	2	\$709,600	Withdrawal penalties from state circuit breaker program, FFP
New Jersey	1983	34,972	234	\$167,826,221	State bonds, FFP
Pennsylvania	1988	91,813	730	\$186,000,000	Cigarette tax, state bonds, county allocations, FFP
Selected Local PDR Programs					
Marin Co., CA	1980	25,504	38	\$17,000,000	State bonds, 10% of unallocated county funds
Sonoma Co., CA	1990	22,850	60	\$34,000,000	.25% sales tax, state bonds
Peninsula Twp., MI	1994	724	10	\$1,253,000	Property tax increase, state grants, FFP
Suffolk Co., NY	1974	5,568	139	\$26,000,000	Municipal bonds, FFP
Forsyth Co., NC	1986	1,236	20	\$1,869,965	County budget reserve, FFP
Virginia Beach, VA	1995	48	1	\$267,016	Property tax increase, cellular phone tax
King Co., WA	1979	12,691	209	\$54,113,724	Municipal bonds, FFP
San Juan Co., WA	1990	670	5	\$1,419,401	Real estate transfer tax
Dunn, WI	1996	174	1	\$260,000	Property tax increase

Source - Tables 3.1 and 3.2 in "Saving America's Farmland: What Works", American Farmland Trust (1997) pages 86-87

FFP: Federal Farmland Protection Program.

Program in Colorado is a multi-purpose programs; the figures in the table represent easement acquisitions on farmland.

Detailed information on setting up a PDR program is available in the Green Corridor Project's publication: "Protecting Your Communities Natural Resources: A Land Protection Toolbox of Local Government"



Funding for this project approved by the Minnesota Legislature: ML1997, Chapter 216, Section 15, subdivision 9(d) as recommended by the Legislative Commission on Minnesota Resources, from the Environmental Trust Fund

The Green Corridor Project Fact Sheet #5

Montgomery County, Maryland
(410) 321-1000

St. Charles County, Missouri
(636) 937-1000

St. Charles County, Missouri
(636) 937-1000

St. Charles County, Missouri
(636) 937-1000

St. Charles County, Missouri
(636) 937-1000

St. Charles County, Missouri
(636) 937-1000

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St. Charles County, Missouri
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Transfer of Development Rights

Transfer of Development Rights (TDR) programs use market forces to simultaneously promote conservation in high value natural, agricultural, and open space areas while encouraging smart growth in developed and developing sections of a community. Successful TDR programs have been in place since 1980, and have protected tens of thousands of acres of farmland and open space throughout the country.

Description

In a TDR program, a community identifies an area within its boundaries which it would like to see protected from development (the sending zone) and another area where the community desires more urban style development (the receiving zone). Landowners in the sending zone are allocated a number of development credits which can be sold to developers, speculators, or the community itself. In return for selling their development credits, the landowner in the sending zone agrees to place a permanent conservation easement on his or her land. Meanwhile, the purchaser of the development credits can apply them to develop at a higher density than otherwise allowed on property within the receiving zone.

The attached sheet provides a visual example of how TDR can work in a community.

Considerations

TDR programs have the advantage of using free market mechanisms to create the funding needed to protect valuable farmland, natural areas, and other open space. However, many people find TDR programs complex and administratively challenging, requiring the local unit of government to make a strong commitment to administering a potentially complicated program and educating its citizens and potential developers. TDR programs must be combined with strong comprehensive planning and local controls in order to be successful.

Where It Is Working

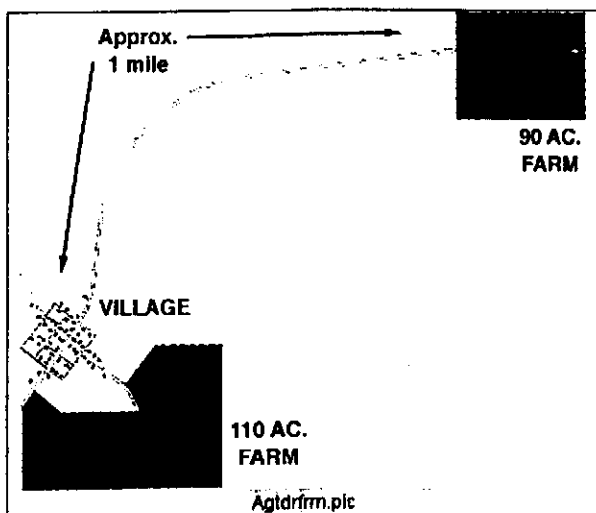
Montgomery County, Maryland, near fast growing Washington, D.C., established its TDR program in 1980. By the end of fiscal year 1997, the TDR program had protected 39,180 acres (out of a total sending area of 89,000 acres) under protective easement. Prior to 1980, the county lost an average of 3,500 acres of farmland per year to development. In the first decade following the establishment of the TDR program, the county lost a total of 3,000 acres to development, a drop of approximately 92 percent.

The New Jersey Pinelands, an environmentally unique and sensitive area of about one million acres, was targeted for protection through The New Jersey Pinelands Protection Act of 1979. The Pinelands Commission, the regional land use authority, established a TDR program in 1980 which had protected 5,300 acres by 1991.

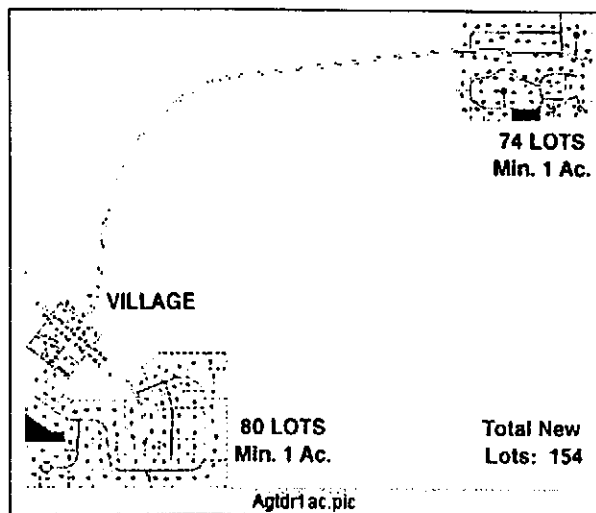
In 1997, the Minnesota legislature passed enabling legislation to explicitly allow local units of government to develop and utilize TDR programs. The Green Corridor Project is working to develop Minnesota's first formal Transfer of Development Rights program.

Transfer Of Development Rights

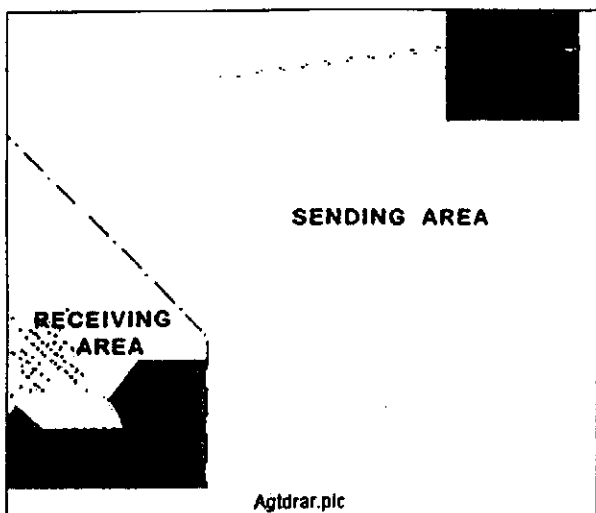
Hypothetical Example



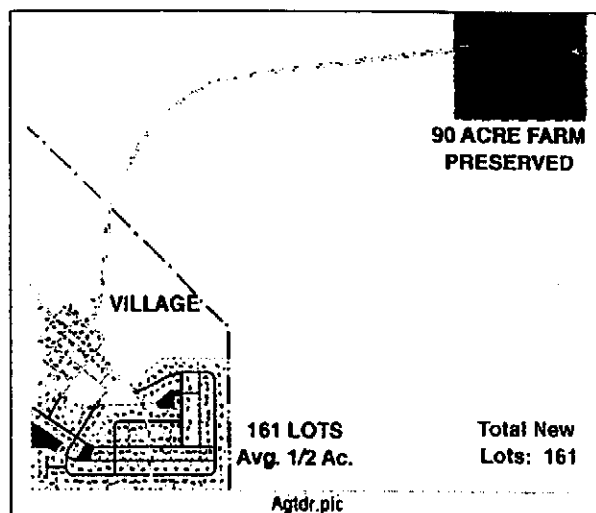
Existing Conditions



Conventional Development



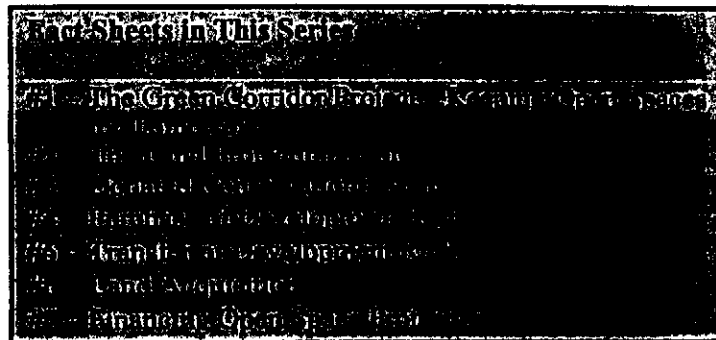
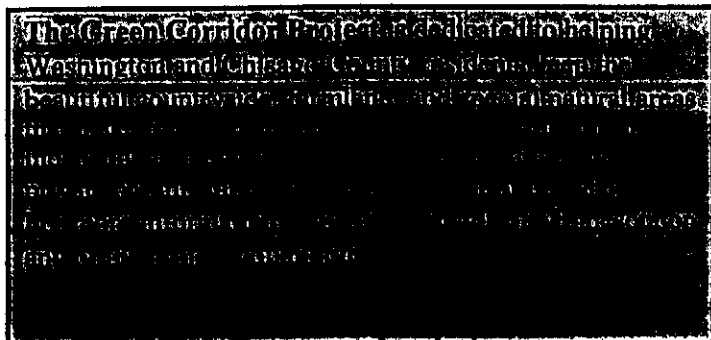
TDR Concept



TDR Implementation

*Note – the actual density bonus is set by local ordinance and need not be this high.

Detailed information on setting up a TDR program is available in the Green Corridor Project's publication: "Protecting Your Communities Natural Resources: A Land Protection Toolbox of Local Government"



Funding for this project approved by the Minnesota Legislature: ML1997, Chapter 216, Section 15, subdivision 9(d) as recommended by the Legislative Commission on Minnesota Resources, from the Environmental Trust Fund



Land Acquisition

Land acquisition is a process in which a public agency or nonprofit land conservation organization purchases all the ownership rights to the land from a willing seller.

WHAT ARE THE PUBLIC BENEFITS OF ACQUIRING LAND FOR CONSERVATION?

- **Special Management Needs of Waterways and Other Sensitive Areas Can Be Met**
- **People Can Enjoy Public Access for Education and Recreation**

Public ownership of land may be the best choice when local governments need full control of the land. Drinking water sources and land by lakes and rivers may need special management to protect water quality. Environmentally sensitive lands such as steep slopes and areas with native plants or wildlife may need special care. People may want public access to the land for education and recreation.

WHAT ADVANTAGES CAN THE LANDOWNER ENJOY?

- **Landowner Paid Full Fair Market Value**
- **Landowner May Receive Tax Benefits with a Donation of the Land's Value**
- **Landowner May Exchange Land to Avoid Tax Liability**

Landowners are paid full fair market value based on an independent appraisal of their land. They may enjoy tax benefits by donating all or part of the value of their land or by exchanging land (purchasing another property within a short period of time).

HOW DOES A PUBLIC AGENCY OR NONPROFIT ORGANIZATION ACQUIRE LAND? WHAT IS THE PROCESS?

First, the landowner and a public agency or a nonprofit conservation organization (such as the Trust for Public Land) negotiate an option or an agreement to purchase the land at a certain time and at a price based upon the appraised fair market value. The agency or the nonprofit organization then identifies and secures funding for purchasing the land and takes care of real estate transaction details: appraisal of the land's fair market value, environmental assessment, title investigation, and land survey. The final step is transferring the land's ownership and payment on a specific date, known as the closing.

WHAT ARE SOME WAYS TO STRUCTURE A PURCHASE TO MEET PUBLIC AGENCY AND LANDOWNER NEEDS?

- **Landowner Can Continue Living on the Land**
- **Payment Can Be Spread Out Over Time**

To provide for a landowner who wants to continue living on the land, a public agency can delay public control of all or a portion of the land by negotiating a life estate or a lease-back arrangement. With a life estate, the public agency pays the landowner fair market value for the land minus the value of the landowner's use during his or her lifetime, which depends on the projected life span of the landowner. The landowner receives payment during his or her lifetime and continues to live on the land.

For tax planning reasons, a landowner may prefer to receive several payments spread over time instead of one large sum at closing; lease-purchase and annuities are two potential methods to meet the landowner's needs. In a lease-purchase, the agency purchases the land after making lease payments through an agreed-upon time period; the title is conveyed to the agency when the last lease payment is made. The total cost is usually the land's fair market value at the time of the agreement plus interest. With an annuity, a buyer purchases an annuity benefiting the seller and receives title to the land. The seller receives annuity payments, a set dollar amount, over time.

Payment by the agency can be spread out or made in one lump sum. For budgetary reasons, a public agency may prefer to pay over time. With a lease-purchase involving only the seller (described above), the agency pays the seller directly over time. When the seller wants to receive a lump sum, but the agency can only pay over time, the agency can use a variety of financing strategies to purchase the land. Please refer to the Financing Land Protection Fact Sheet in this series for more information on financing public purchase of land for conservation.

WHERE DO PUBLIC AGENCIES SECURE FUNDS TO PURCHASE LAND?

Funding is available from many different sources, both private and public. Local sources used elsewhere in the United States are property taxes, special assessment districts, sales and use taxes, real estate transfer taxes, impact fees, bonds, and user fees. Other public sources are state matching grants, mitigation funds, and habitat protection funds. Corporations, foundations, and individuals may contribute private funds. Being creative about funding strategies and assembling funding from several sources may make land protection possible when it would otherwise be difficult. The Financing Land Protection Fact Sheet in this series provides more information about funding sources.

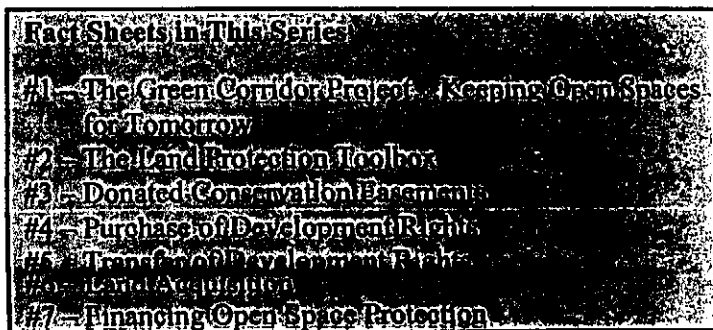
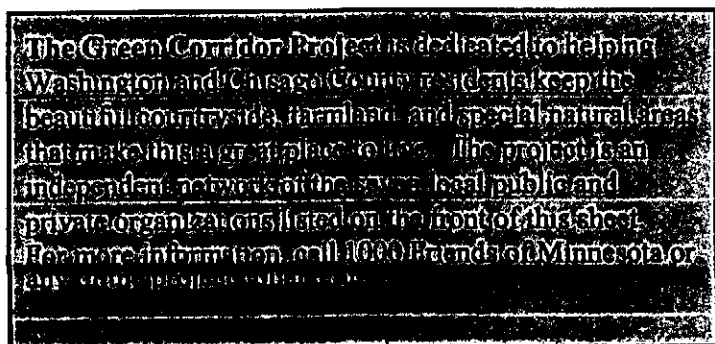
HOW CAN LAND PROTECTION AND DEVELOPMENT BE COMBINED?

- **Limited Development May Be a Solution**

In some cases, the most important part of the land can be protected while the rest of the land is developed in a manner which is compatible with the public open space and is sensitive to community interests. Limited development may generate sufficient funds to preserve open space without public funds.

To learn more about purchase of land by public agencies or nonprofit organizations, contact the Trust for Public Land.

For more information on these tools, refer to the other fact sheets in this series.



Funding for this project approved by the Minnesota Legislature: ML1997, Chapter 216, Section 15, subdivision 9(d) as recommended by the Legislative Commission on Minnesota Resources, from the Environmental Trust Fund

Green Building at Oberlin is a Dream House for Environmental Studies

Chronicle of Higher Education, Jan. 21, 2000, p. 106

OBERLIN, OHIO

THE NEW environmental-studies center at Oberlin College is a tan-brick building, nothing fancy. But inside, with its soaring, arched ceiling and sun-filled atrium, it is an inviting place. On a clear fall day—bright, with a brisk wind whipping up scraps of litter—it's still full of the sounds and sights of construction: whirring drills and rasping saws, stacks of lumber and crumpled cheeseburger wrappers. The blare of radios is overlaid with the whistling of carpenters who match melodies to the thump-thump of their hammers.

Strangely absent is the acrid smell usually associated with construction—the noxious fumes from chemicals in paint, varnish, fabric, and new carpeting. "You notice it?" asks David W. Orr, chairman of the environmental-studies program, who is taking a visitor on a tour of the nearly completed structure.

You notice it immediately. Its absence startles the senses, as if you expected to hit a wall and found—a window.

That's only one of the many beneficial byproducts of a structure that college officials hope will serve as a new paradigm of ecological design and education.

Oberlin's center, which opened last week, is not the first environmentally friendly building, but it "has more features than virtually any other 'green building' " to date, according to Mr. Orr.

These include photovoltaic cells on the roof, which convert sunlight to electricity, and the "Living Machine," an organic system that purifies and recycles up to 2,000 gallons of wastewater a day.

Other features are wood from certified sustainable forests, compostible fabrics, nontoxic—and odor-free—paints and varnishes, and recycled materials in everything from the steel framing to the bathrooms' ceramic tiles.

The building is the brainchild of Mr. Orr, who has shepherded it from bright idea through the sometimes delicate, sometimes bare-knuckle process of approval, fund raising, design, and, now, construction. He is the author of two books, *Earth in Mind* and *Ecological Literacy*, and the son and grandson of preachers. If from time to time his voice takes on the fervor of an environmental evangelist, it's understandable.

"The goal of this building is to be a zero-discharge building," he says. "To the extent we can, to make sure that no waste product leaves it, that things don't go to landfills, that we recycle back to new projects."

In a first-floor classroom, he demonstrates how the carpeting is laid in squares. When an area becomes worn, the squares can be taken up and replaced individually. What's more, the college didn't buy the carpet; it's just using it, under a new "green lease" program offered by the manufacturer. "The carpet goes back to the manufacturer when it wears out, and it's recycled into new carpet," Mr. Orr says.

Leading the way into one of the upstairs classrooms, he points to sensors that keep the lights on only when someone is in a room. "It's a smart building," he says. "It provides services when you need it, where you need it."

The Adam Joseph Lewis Environmental Studies Center comprises a two-story rectangle with a large atrium, offices, and classrooms, and a small wing

David W. Orr, the chairman of environmental studies: "The curriculum embedded in any building instructs as fully and as effectively as any course taught in it."

that houses a 100-seat auditorium and the Living Machine. Outside, the landscaping will include a greenhouse, an orchard, a vegetable garden, a miniature wetland, and a "solar plaza," marking the vernal and autumnal equinoxes and the summer and winter solstices via calibrated shadows. The goal, Mr. Orr says, is to reconnect Oberlin's largely urban student population "with soils, water, sunlight, forests, and the competence to use these things well over the long term."

The landscaping also promises to provide a pleasing outlook from the two-story atrium, which has floor-to-ceiling windows facing east and south to passively take advantage of solar energy for heating. The triple-paned windows are filled with argon gas, which acts as a barrier to heat loss in the winter and heat gain in the summer. "Even with all the glass, we'll get down to a fifth of the amount of energy typical buildings use to heat, ventilate, light, and air condition," Mr. Orr says.

Savings such as that impressed the American Institute of Architects, which has already bestowed an award on Oberlin for the building's "innovative and imaginative design solutions."

The institute also cited the educational value of the center's planning and design stages, which began in the fall of 1995 and included 13 "charettes," or public-design meetings, open to anyone who was interested—students, faculty members, townspeople. That was even before the architect, William McDonough, who is also dean of the School of Architecture at the University of Virginia, came on board.

"Our intent was to use this as a pedagogical event," Mr. Orr says. The move turned out to be politically astute as well as educational. The project ran into no major opposition. "If you hit people with this stuff cold, I think it's a problem," he says. "Everybody knew what we were doing from the very start."

OUT OF THE PROCESS emerged a handful of design criteria for the building, along with one overriding aesthetic standard: "This building should cause no ugliness, human or ecological, someplace else or at some later time," Mr. Orr says.

"So that forces you to think about—no matter what a building looks like—if it caused ugliness where materials were taken from the earth, or if it caused people to get cancer where the materials are manufactured, or if it puts organo-chlorine compounds in the bloodstreams of the students we teach, or if its operation requires massive amounts of fossil fuels that then alter climate, you can't call the thing beautiful."



FRANK W. WARD FOR THE CHRONICLE

Forcing students to recognize such tradeoffs is another aspect of Mr. Orr's idea of the building as a pedagogical tool. "This isn't just a place where classes are held. If we had wanted to do that, we could have wheeled in a couple of doublewide trailers."

In his view, the building itself becomes an extension of teaching by example: "The curriculum embedded in any building instructs as fully and as effectively as any course taught in it," he says. "The extravagant use of energy in buildings, for example, teaches students that energy is cheap and can be wasted. Windowless rooms, or those with windows that do not open, teach that nature is to be held at arm's length."

By contrast, one of the first things a visitor will see upon entering Oberlin's building is a "data display panel," keeping tabs on how well the building is doing from an environmental standpoint. "The panel will show how many kilowatt hours the roof is collecting, how many B.T.U.'s the building has captured, the state of indoor air quality—25 to 30 pieces of data," says Mr. Orr. "The building is monitoring its own performance."

The center will also offer research opportunities to students—for example, studying how and how well the Living Machine performs, and assessing the long-term costs of the structure. One of Mr. Orr's students is already investigating how much carbon dioxide was released during construction.

"We want to take this project, like you'd take a wet dishrag, and wring all the educational value out of it, from the start, all the way out into the future," says Mr. Orr.

His approach is indicative of a new direction in the environmental movement, which "has often been about how to stop various kinds of things," he says. "This building represents a different way to think about it. This building is about how you start things."

Mr. Orr would like to see the building become a model replicated on a larger scale on college campuses across the country. "Relative to the potential of ecological design," he says, "this is Kitty Hawk, and we're 13 feet off the ground."

From frustration among some professionals with the limitations of traditional erosion control techniques, to public dissatisfaction with typical hard-surface solutions, a trickle of a trend is emerging that pairs innovative product technology with living systems to produce more environmentally sensitive and effective erosion control solutions.

Tim Pollowy, staff ecologist with Applied Ecological Services (AES) in Brodhead, WI, dubs this approach holistic, and prefers to think of himself as an environmental restoration specialist rather than an erosion control technician, while Jon Coe, a principal with Philadelphia-based CLR-designinc., sees even bigger things ahead for interdisciplinary teams of erosion control specialists, landscape designers, and structural engineers.

"One of the main missions of our practice," says Coe, "is to help better unify the structural and the living world. Heretofore it's been a contest. There's no reason, for example, that freeway abutments across the country couldn't all be living walls." Coe goes on to describe daydreams about constructing large buildings with structures of concrete or steel and skins of soil and living plant substrates that would produce a biofilter for recycling wastewater that could in turn be used to irrigate the living structure.

As the movement now referred to as bioengineering introduced living things into the erosion control equation to produce more sensitive, and often, more sound solutions to erosion control problems, new generations of products are making it possible for interested ecological specialists and landscape designers to segue into erosion control work, as well as expand opportunities for erosion control engineers to take another look at how they typically do things.

Products such as the gridless retaining wall system can be used to construct vertical walls up to 15 ft. high, for example, and these can

then be planted and irrigated to produce a version of Coe's living walls. The system allows spacing between the blocks for vegetation to be planted, and can particularly be effective when used to protect concrete retaining walls from wind and water erosion.

New Ways to Hold Soil

Holding soil until seed germinates, especially on steep slopes, is another predictable erosion control problem often solved by installing erosion control blankets or applying bonded fiber matrix products to bare slopes. Spittle Enterprises in Huntersville, NC has been experimenting with a product sprayed from a conventional hydroseeder it calls Hydro-Blanket that locks soil particles together mechanically rather than chemically to reduce sediment loss.

Always on the lookout for a product he can hydraulically apply to



Nowhere in the regulations does it say that erosion and sediment control practices have to look "government issue" to be effective.

LANDSCAPE DESIGN & EROSION CONTROL

Penelope O'Malley

MARCH/APRIL 1997

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www.erosioncontrol.com

EROSION CONTROL

steep slopes and get satisfactory seed germination as well as erosion protection, Ricky Walker, NRCS soil conservation technician at Fort Jackson in Columbia, SC, was introduced to the product by his seeding contractor. He opted to evaluate the recommendation by comparing it with a conventional practice.

To hold soil during seeding, Walker's operation typically uses an average of a ton and a half of wheat straw per acre crimped into the ground with a straw crimper or plow, a process that isn't feasible on steep slopes. To test the two practices, Walker evaluated two plots, one of what he called "extremely hard ground" on the backside of an old inert landfill, and the second in an area where the soil was particularly sandy. Both plots were approximately 3 ha (0.75 ac.), and each was equally treated with the two products. The landfill site was graded as much as possible using a bulldozer and a backhoe, after which seed was broadcast with fertilizer and lime, and a drag harrow was used to loosen the crust and mix everything in. "I come from a farm background," says Walker, "and I believe in getting cover on the seed. What we try to do is incorporate the seed into the ground, even if we have to rake it by hand."

Both products were applied at a rate of 3,400 kg/ha (3,000 lb./ac.), and Walker opted to follow the manufacturer's instructions and split the application into two parts. Neither test plots received artificial watering. Walker says germination was at least 25% better in the site using the Hydro-Blanket, and erosion control also was appreciably better, in part because it didn't set up a hard surface crust that caused water to shed off. Walker says he'll continue to use the product on steep slopes, although he thinks it will be cost prohibitive when large areas have to be covered. Debbie Marshall of Marshall Landscaping Inc. says she likes the product because it reduces erosion and seems to enhance germination by holding moisture in the soil, and because it is easier for the seedlings to come through. Marshall estimates the product is a little more expensive than standard mulch but competitive with erosion control blankets or conventional chemically bonded fiber matrix products.

Fertilizer Tea Bags

A common frustration in applying fertilizer to newly vegetated sites is the lag time between when fertilizer is applied and the seed germinates. By the time the seed can use a boost, the fertilizer is long-gone. Russ Nakae, president and owner of Nakae & Associates Inc. in Westlake Village, CA, solved the problem with time-released "tea bags" of fertilizer from Reforestation Technologies International in Monterey, CA.

Nakae used the time-released fertilizer in the 280-ha (200-ac.) revegetation project he designed and installed along the 44-km (17-mi.), four-lane San Joaquin Hills toll road in southern California's Orange County, including 64 ha (160 ac.) of coastal sage habitat and 10 ha (25 ac.) of wetlands. Closely regulated by the California Coastal Commission, Department of Fish and Game, and local agencies representing the towns the freeway passes through, Nakae's effort was subjected to strict performance standards that were in turn tipped off kilter by numerous construction delays resulting from lawsuits that attempted to block the project.

"We started in 1991, and we worked with the project biologist, the landscape architect, and all the local cities, each of which had its own requirements," explains Nakae. "We had to make sure that while we were meeting their criteria we also prevented erosion, because none of this was going to work otherwise." Nakae's usual preference is to allow seed to establish for 30 days before fertilizing, and previously his preferred method to get the fertilizer to the plants when they need it has been expensive—spraying from a helicopter.

A further complication was that the resource management plan for the project called for establishment of mycorrhizae fungi, which typi-

cally is destroyed when fertilizer is applied. To solve these various problems, Reforestation Technologies formulated a time-released fertilizer that worked in union with the mycorrhizae, aiding plant development without destroying the fungi. Although Nakae estimates the cost of fertilizing this way is about four times the cost of standard fertilizers, the overall cost to the project was less, in large part because of reduced personnel expenses associated with reseeding and weeding. "We gave the plant and weeds an even chance instead of giving the weeds a headstart," says Nakae. "The first year even the biologists were surprised at what little weed growth we had."

Reforestation Technologies' reformulations also have successfully been used on steep cutbanks in Cumberland Gap National Park under the supervision of NRCS; by the Nova Scotia Department of Natural Resources in Truro, NS where Reforestation and Silvicultural Officer Sandy Chisholm maintains that after two years both the growth and survival rate of various species of birch, spruce, and true fir dramatically were improved over control plantings; and in a wetlands project in the Columbia Basin Wildlife Preserve at Moses Lake, WA, where sites not treated with Bio-Paks had vegetation losses of from 25 to 30%.

Futher Innovation In the Hills

For slope protection during germination on the San Joaquin Hills project, Nakae tried silt fences, straw bales, and sandbags before finally settling on a combination of hydroseeding and straw wattles. "We found that the best erosion control was plant and root development," says Nakae. "And we found conventional hydroseeding was the best way to do it because the other products inhibited seed germination." The straw wattles were installed on contour and placed on 1.5-m (50-ft.) (or less) centers. Additionally willow wattles made from material Nakae's crew gathered from local streambeds were used in the wetland restoration. "I was not a big advocate of these wattles when the project started because it looked like somebody was trying to sell us a bill of goods, but they worked," Nakae admits.

Nakae pushed the envelope in a number of aspects of the project, including irrigation. "What we've generally been taught over the years is that when you develop an irrigation system you have to have 100 percent coverage, or 100 percent overlap. When we tried that we couldn't get root development because we couldn't get the watering time. With 100 percent overlap we could get a maximum of two hours of watering time before we got runoff.

"So we went back to the principles of farming, where they're just watering to cover the ground and aren't concerned with overlap. We were able to increase the watering times from between eight to 12 hours and get water penetration of 12 to 18 inches per water cycle. As soon as we started doing that we started getting root development."

The final learning experience was working according to performance standards, whereby particular benchmarks strictly were specified—a certain percent of plants established in a certain area in a certain period of time. Nakae thinks working this way is much more productive and cost-effective. "Architects and biologists may know what the goal is," he says, "but they don't know how to achieve that goal because they have no hands-on experience. The current standards in the industry where all you're trying to do is the cheapest job for the least amount of money is not the best way to accomplish what you want to at a reasonable price."

A Home for Bears Bares Fruit

To construct the living green walls that inspire him, CLR-designinc.'s Jon Coe uses a combination of geotextile blankets and vegetation. "I

became aware some time ago of these geotextile blankets they use for retaining embankments on freeways," Coe explains, "where they just use a precast concrete face to create a vertical wall. The face is cosmetic and it also prevents erosion, but the geotextile blankets and the compacted soil between them is what actually holds up the whole assembly.

"I got to thinking if the precast concrete isn't structural, why can't we do the same thing with plants? So we came up with the concept of building structural embankments where the end of the soil blanket actually rolls back on itself every row, and you then sod or seed the face that results."

Coe used this principle in a polar bear exhibit at the Seneca Park Zoo in Rochester, NY. The animal side of the exhibit has a freestanding shot concrete wall about 5.5 m (18 ft.) high, and the public walks around the back side of this wall, which means it has to look good. What Coe did was to create a green wall about 3 m (10 ft.) high, sloping back gradually up to the top of the concrete. The resulting structure was planted with juniper and spruce and arctic wildflowers as well as grass to complete its natural appearance.

"We wanted it steep enough that kids couldn't climb up it, and we wanted it strong enough to retain a 10-foot depth of fill," says Coe. To accomplish this, the designer called for putting down a blanket, filling it with a foot of soil and compacting it according to the manufacturer's specifications, then rolling the blanket back over the top of the fill. Another blanket was laid on top, then another soil level, etc., proceeding upward with a near-vertical wall. Like frosting between a cake, except that the blanket was turned back on itself at the end. When the structure was in place it was hydroseeded, although Coe says sod also can be pinned onto the top surface. The vegetation is maintained by continuous underground trickle irrigation that runs through approximately every fourth level.

Coe designed a similar project for the tundra interpretative center at the Woodland Park Zoo in Seattle, WA. "We wanted the building to disappear from the outside because it's in an arctic exhibit, and you don't find big buildings up there. So the walls were built back into the slope and the front was covered with a green wall coming out four feet from the top of the building and about eight feet from the base of the building. It was about 15 feet high and covered with grass and flowers and a few shrubs to make it look like a type of Neolithic pit house. After we designed it I watched a *National Geographic* special on Kodiak bears and the native people of Kodiak Island actually live in houses just like this. I thought I was creating the distant past, but that is exactly the kind of houses they live in. And Kodiak bears occasionally walk across the roofs."

As designers dream up innovative ways to use more conventional erosion control products, manufacturers are experimenting with technology that can make their daydreaming easier. Bill Bohnoff of Invisible Structures describes a new revegetation containment product that starts with a plastic grid with molded 2.5 cm- (1 in.-) high rings—5.7 cm (2.25 in.) in diameter and 0.3 cm (0.1 in.) in width and modified with cross bars on every fourth row of rings. When locked on steep slopes, the product prevents small erosion channels from developing between the rows of rings by creating microencapsulation of soil.

To further contain the soil and prevent undercutting, Geojute erosion control fabric is bonded to the bottom of the plastic grid, which allows the structure to be filled with soil, lifted up, and installed on-site. "Add vegetation and the root system, and you've got three-dimensional containment," says Bohnoff. Invisible Structures currently is working with Pacific Sod to develop a ready-made, sod-filled structure that can be rolled in place.

Original Thinking Required

Tim Pollowy suggests such products are only as good as how and where they're applied. In Pollowy's view, it can be too easy to apply blanket (pardon the pun) solutions to problems that require original thinking. "There's a tendency to apply products and solutions across the board," says Pollowy. "We try to go out and assess the situation and what's causing the problem." One of Pollowy's concerns is that easily available computer software can make it too easy to spec across-the-board erosion control solutions. "With some consulting companies, it's pretty obvious they've got some standard details on their computer for shoreline treatments, and they fit a shoreline to a treatment rather than designing a treatment for the condition," Pollowy observes. On the other hand there are cases where computer software can free up consultants for the field work Pollowy thinks is essential.

Dustin New, project coordinator for J.F. New and Associates in Walkerton, IN, specialists in wet-lands development, likes a new software program called Erosion Draw that provides erosion control standards that can be directly incorporated into planning drawings. "These are standard details which everybody usually just photocopies and puts on sticky backs and then puts them on their plans," New explains. "What Erosion Draw does is allow you to do your plans on the computer and just pull these details right in. You get a much cleaner set of plans." New also thinks the software saves time and duplicated effort, and the clearer drawings make points with both customers and regulatory agencies. "In Indiana if your development is over five acres, you have to have an approved erosion control plan," New explains, "and this eliminates a lot of headaches down the road if you take care of it in the beginning."

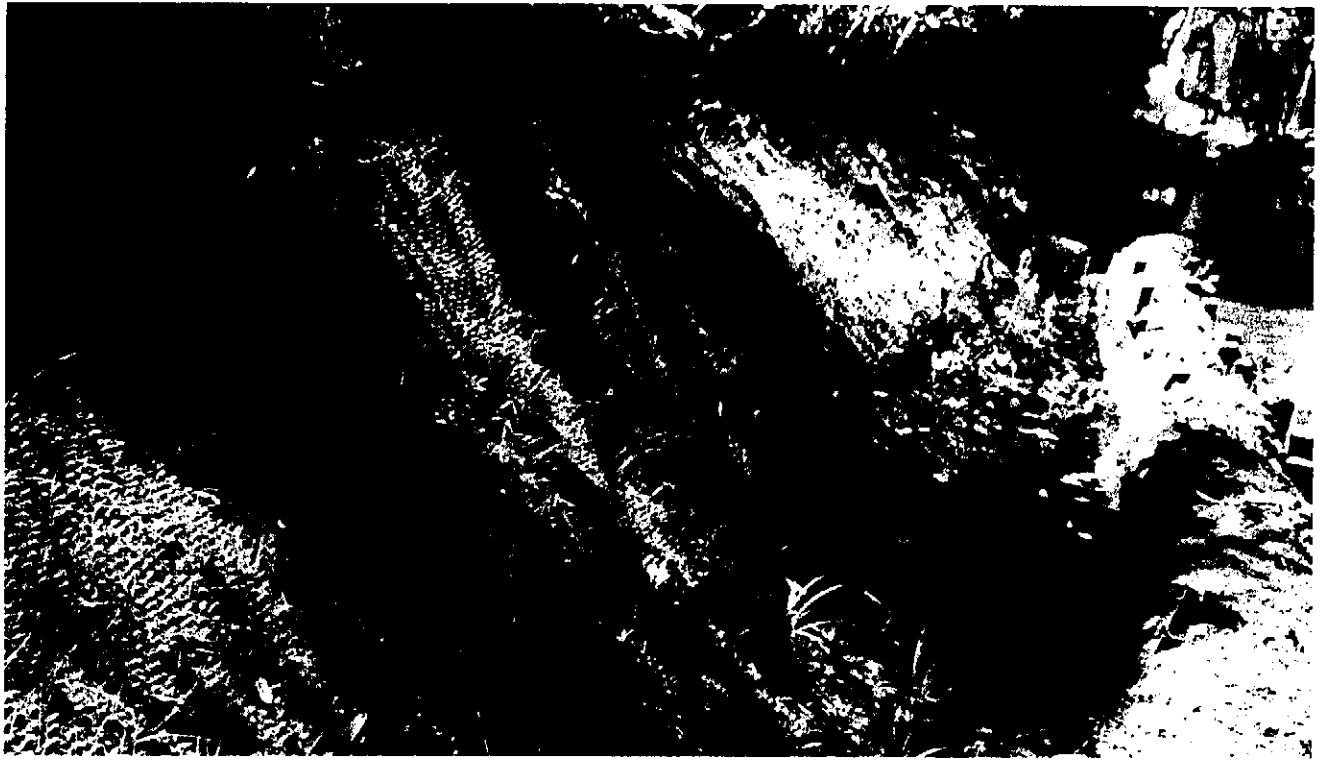
"We were doing a stream restoration project for Sand Creek golf course in Chesterton, Indiana, and the details for all drawings were taken from Erosion Draw. If we hadn't had it, we probably would have done what we've done in the past—Xerox copies from originals that already were second- or third-hand. It made a much better presentation, much more readable. The material is written by someone who is used to writing specs, and they're concise and well-written."

The Long-Term Holistic Approach

"We're trying to take what some people call the ecological approach," explains AES's Pollowy, who is trained as a landscape architect. "We're looking at why things are the way they are and what's going to affect them five to 10 years down the line." Pollowy wants to know, for example, if a wetland restoration project calls for eradication of introduced vegetation that might crowd out indigenous plants over time. Does a revegetation plan consider the effects of shade suppression over the long term?

"I personally don't think it's any more complicated to do this kind of analysis," he maintains. "Yes, you need to understand a number of different things, but maybe it's not one person, maybe it's several people—an engineer who understands hydrology, a landscape architect who can put the different hardscape elements together, and maybe an ecologist who can understand the ecological dynamics of the plant community. Or if you're lucky enough maybe one or two people can start to fill multiple roles."

Called in to stabilize wind erosion on a pond for The Prairie Crossing development, Pollowy's group first looked at wave dynamics. "A one foot-high cutback had started on the windward side of the pond, just from the waves bouncing off the shoreline," he explains. To combat the problem, AES installed fiber roll and then planted it. "Normally on a hard bank the waves will come in, hit the hard surface, curl under the water, and start to scour and reflect back to the pond or back to the



Fiber roll (below) absorbs and reflects energy from flood waters while protecting toe of slope. Littoral shelf behind fiber roll is planted with native emergent wetland vegetation. Slope (above) is protected with geotextile grid. Cover crop seed has begun to germinate and is visible in photo. The concept is to restore stream morphology and vegetation patterns by creating a stable flow and bankfull channel, with a vegetated "floodplain" (littoral shelf) and stabilized sideslopes.

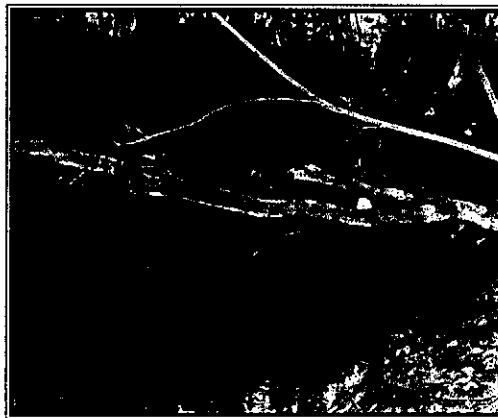
open water area. With the fiber roll in place, what we're seeing is some of that energy being absorbed. Silt was falling out of the water column and actually starting to form a littoral shelf in front of that fiber roll, which has since turned out to be an ideal habitat for the plants. It's really turned into an ideal situation and it has a lot to do with those wave mechanics. Instead of reflecting the waves, the fiber role is absorbing a lot of that energy."

A streambank stabilization project further illustrates Pollowy's philosophy. The idea was to stabilize 1:1-sloped streambanks on a 6 m- (20 ft.-) wide creek, where the banks backed up to residential development on both sides, making it impossible to use mechanized equipment. Pollowy's group used a combination of fiber rolls and coconut geotextile grids, live plants, and seeding. "We tried to respond to the hydraulics of the ditch. You could still see where the selwage went through the creek, so we put the fiber rolls toward what we thought the cutbank side was where the Thalweg would sort of bounce off the fiber roll and redirect it. This

was after we cleaned out the existing riprap and rubble. We also spent about 10 days doing brush removal on less than 1,000 feet of the creek. Although there was a lot of mulberry, box elder, and buckthorn, underneath there was bare soil. Right now we're in the process of finishing with 3,500 live stakes, using some of the tougher sedges and bulrushes, and some of the tougher forbs that can withstand the rough conditions. It would have been nice to do some brush layering, but that really wasn't possible because you couldn't get the machinery in there."

The most important factor Pollowy emphasizes is that none of these

various solutions was continuous. "There isn't fiber roll down both sides; it's alternated. The live plants were put in groupings—more where they were needed, less where they weren't—rather than one plant per linear foot or two. Where it's too steep to put in live plants and you probably wouldn't have much success seeding, the live stakes went in, things like dogwood and sandbar willow, which aren't going to do the shade suppression damage that mulberry and box elder can do."



Pollowy says he learned much of this approach by walking through wetlands and trying to identify what's going on. "Pretty soon you find out that there are things that are really common in disturbed areas and those are things that can withstand disturbed conditions. I think a lot of is getting out and opening your eyes and walking around and seeing what's going on out there."

Asked whether the philosophy he typifies has a chance of going mainstream, Pollowy answers, "I've met more and more engineers who are willing to take water out of a pipe and put it into a swale. They see research that water running

through wetland areas can reduce nitrates and phosphorous and heavy metals and they say, 'Okay, let's take it out of a pipe and run it through here. I don't know what these plants are—they all look like weeds to me—but I'll get somebody who can do the plants.'

"It's not necessarily coming out of one area, but it's a small trickle of people from a lot of different areas trying to come together." EC

Guest author *Penelope O'Malley* is a frequent contributor to technical and environmental publications.

How Cities Green the Planet

By packing people into a small area and by using high-tech foods, fuels, and building materials, cities leave most of the earth free for wilderness.

Peter Huber and Mark P. Mills

Think of the skyscraper as America's great green gift to the planet. It packs more people onto less land, which leaves more wilderness undisturbed in other places, where the people aren't. The city gets Wall Street, Saks, the Met, and the Times Square crowds, which leaves more flyover country for bison and cougars. It's Saul Steinberg's celebrated *New Yorker* cover, painted green.

Among all the various metrics of green, land is by far the most important and, in today's debate, the most often overlooked. As traditional conservationists have always recognized, land—broadly defined to include streams, rivers, and coastal waters—is critical, because that's where the wild things are. The less real estate we occupy for economic gain, the more we leave undisturbed as wilderness. And the city, though profligate in its consumption of most everything else, is very frugal with land. The one thing your average New Yorker does *not* occupy is 40 acres and a mule.

As it grows—or, as the Sierra Club sees it, as it sprawls—a city does indeed seize land. In 1800, Manhattan ended at about City Hall Park; farms and unsettled wilderness occupied everything north of Chambers Street. In 1811, when the Commissioners' Plan laid out the New York City grid, it extended only to 155th Street—the Commis-

Contrary to conventional green wisdom, cities, like London (right), are no threat to the environment.



GEORGE VICAT COLE, "VIEW OF THE THAMES AT GREENWICH," CHRISTIE'S IMAGES THE BRITISH ART LIBRARY

How Cities Green the Planet

sioners not being able to imagine that the city would extend beyond that point "for centuries to come." Even as the twentieth century opened, Vincenzo Bendetto was still farming his family acres at Broadway and 213th Street. Today's seamless Manhattan spread of tarmac, concrete, and high-rise is just yesterday's sprawl come of age.

The sprawling hasn't stopped, around New York or any other major city. Nationwide, cities, suburbs, and local roads cover about 27 million acres, and highways cover as much again. This 54-million-acre total is well over double the area occupied in 1920. Thousands of acres of farmland and forest are developed every day in the environs of cities and towns. One projection foresees 60 megacities in America by 2050, with over 10 million people each—a total of city dwellers that is more than double the population of the entire nation today. These cities, one should then expect, would doubtless cover something like twice their current area.

This is what so alarms the greens, and they're determined to stop it. "This time the enemy isn't the Soviets, but sprawl," declares New Jersey governor Christine Todd Whitman. It's "a virus eating us from the inside out," says the Sierra Club. In January 1999, Vice President Gore proposed a \$10 billion program of "Better America Bonds" to help cities contain themselves. The idea is to halt the city's organic growth with collars of development-free green. And by containing the city we will . . . well, what exactly *will* we achieve?

Just the opposite of what the sprawl police suppose. Collaring the city will culminate in less wilderness, not more. The natural growth of the city is the best thing going for the wilderness. The rise and spread of the metropolis has brought about a magnificent renaissance of green.

Sure, our cities are big, but the country is a lot bigger. Cities, suburbs, roads, and all the highways cover under 3 percent—yes, only 3 percent—of the 2 billion acres of land that constitute the lower 48 states. If that percentage seems implausibly low, it's because our casual impressions are so biased. Some 80 percent of us live in the cities or their immediate suburbs, and we spend almost all our time there.

That's today. In 1790, the demographics were reversed: the U.S. population was 80 percent rural. What brought about such a remarkable shift? Technology, mainly: relentless improvements in agricultural productivity have enabled us to feed more Americans and more of the rest of the world, too, using less land. The farmers stopped farming; their children moved to the city.

The city has had a second, equally powerful environmental impact: it has lowered fecundity. Cities grow not because the people living in them have a lot of children, but because the people in the country do. Absent continuous immigration, the population of cities would shrink. Population growth in the city represents, in large part, population decline out in the sticks.

People come to the city in search of money; and money, it appears, induces them to have fewer children once they get there. This much is clear: where wealth rises, fertility falls. Rural versus urban figures confirm that fact, so do developed-world versus developing-world statistics, and so do the historical trends. Developed-world fertility has been falling quite steadily for two centuries. In the United States, it dropped from eight children per woman to two.

Parents recognize, it seems, that wealth permits them to raise fewer, more robust, children, and, given the chance, that is what they choose to do. When people get rich enough, lifetime fecundity falls to the point of zero population growth, or below. This takes a while, of course. At first, more resources, more wealth, make possible more life. Richer people live longer. More women grow to adulthood to bear children of their own. Population rises, just as Malthus said it would—with just one critical correction: the lowering of fertility. Wealth concentrates in the city, and it is there that fertility drops the furthest. So far as the wilderness is concerned, the green case for the city can be as simple as that. The city is a population sink. To put it another way, the view from Wall Street is the greenest on earth.

For America as a whole, wealth and city overtook poverty and country sometime around

1920. Until about that time, the effects of immigration, an increasing life span, and a rising demand for food outweighed the effects of rising agricultural productivity and declining fertility. As a result, forests contracted. But around 1920, the balance shifted, and forests began to expand once again.

The upshot has been a truly remarkable, if little noted, environmental reversal: the steady reforestation of the American continent. When Europeans first arrived—after millennia of deforestation by fire, promoted by American Indians—the area now represented by the lower 48 states had about 950 million acres of forest. That area shrank steadily until about 1920, to a low of 600 million acres. It has been rising ever since. Just

how fast is hard to pin down: the continent is large, most of the land is privately owned, and definitional debates rage. But all analyses show more, not less, forest land in America. And all agree that roughly 80 million more acres of cropland were harvested 60 years ago than are harvested today. Most of this land is on its way to being reforested, too. At least 10 million acres have been reforested since 1987 alone. Thus, for the first time in history, a Western nation has halted, and is now rapidly reversing, the decline of its woodlands.

Why do so many of us believe just the opposite? We've been spun, that's why. Green activists and their political friends publicize only half of the environmental ledger and play a shell game with definitions. They're engaged in a great green fraud, and a very harmful one, too.

Definitions first. The anti-sprawl activists often count as "developed land" some 90 million acres of farmsteads, field windbreaks, barren land, and marshland. This rural land has nothing to do with any reasonable definition of urban sprawl or even of "development," and to count it

as such is to conflate Trump Tower with a stand of poplar trees grown by a farmer as a windbreak. But the activists need these 90 million acres, because if they admitted that cities and their suburbs covered only a tiny 3 percent of the continental U.S., who could take their fear of sprawl seriously? That extra 90 million acres makes it seem as if the "sprawling city" covers 150 million acres, more than double the real number. This begins to sound like quite a lot, though it is still only 8 percent of the 48 contiguous states.

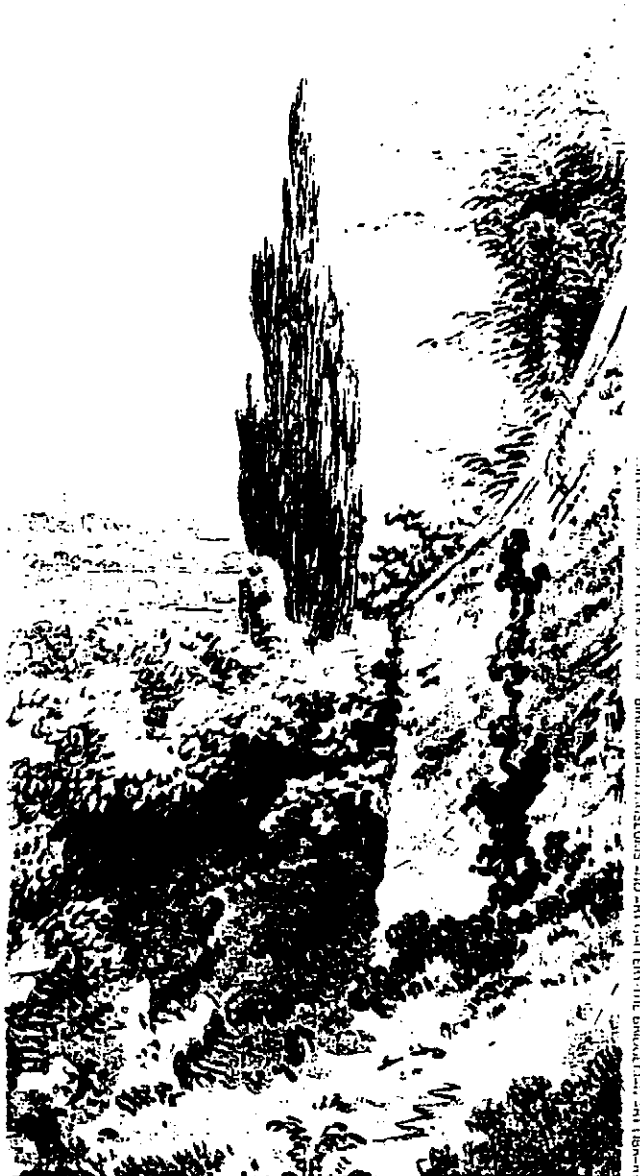
Now, the ledger.

Some 25 million acres of land have given way to new development of one kind or another in the past three decades; perhaps half that area was farmland that gave way to suburbs at the periphery of cities. The expansion

of the city largely replaced one human use of land—agriculture—with a second—dwellings. Where we used to house corn and cattle, we now house ourselves. No great loss for wilderness there, but that's the half-story we hear about. What we don't hear is that, during exactly the same period, 95 million acres of agricultural land even farther from the city returned to wilderness or began the process of doing so, now that farmers no longer cultivate them. In other words, far more land is being relinquished by agriculture to wilderness than is being converted from agriculture to suburbs. A fair estimate of the net gain for wilderness: some 70 million acres in the last quarter century. The loss of agricultural land to the city has meant a loss in greenish vistas for (mostly wealthier) people living at the periphery of the suburbs but almost no loss of true wilderness. The simultaneous, and much larger, return of agricultural land to wilderness farther out was just that—an enormous gain for the wild.

The city curtails not only its own Malthusian propensities but the country's, too. The city plants no taters or cotton, but it's very good at

“The rise and spread of the metropolis has brought about a magnificent renaissance of green.”



cultivating two things greener still: capital and knowledge.

For at least a century now, the average American has eaten more food and consumed more energy, even as the American farmer has plowed fewer acres and cut less wood. We accomplished that by learning to live in three dimensions, not just two, taking less from the living surface of the planet and more from its sterile depths. Cement, steel, and synthetic plastics displace hardwoods in our ships, dwellings, and furniture, leaving the wood itself to the forest. Fossil and nuclear fuels displace wood in our residential and industrial furnaces. Fertilizers, pesticides, factory farms, and high-yield crops from the laboratory substitute, at the margin, for some three-quarters of the acres once needed to produce equivalent amounts of food. It is by extending human enterprise into the third dimension that we painlessly retreat from the two-dimensional surface, where the rest of life dwells. Cities expand skyward and extract their building materials and fuels from the depths of the earth; they exert their pressure on the planet vertically, not horizontally.

Moving our economy into the third dimension has required one input above all others: capital. It takes vast amounts of it to extract oil from two miles beneath Alaskan ice or Saudi sand, or to process the oil into plastics that then displace teak and ivory, or to reconfigure the genes that quadruple yields on the farm. From wood to coal to oil to uranium, the higher the technology, the more capital it requires to burn it, and the less natural resource. And you don't raise capital down on the farm, alongside the hogs. You raise it on Wall Street, among the bulls.

The second crucial input to the three-dimensional economy has been knowledge. Oil two miles beneath Alaskan ice or Saudi sand is not "wealth" at all. It doesn't belong to anyone, least of all to "the world." We call such things "resources" by convention, but the "resource" is not the stuff itself; it's knowing how to get it. Anyone can gather wood and burn it—man has been doing that successfully for tens of thousands

Even big cities, like Rome (left), take up a surprisingly tiny fraction of the earth's surface.

of years. Gathering and burning uranium is very much harder, but a tiny volume of it, prepared just so, can heat and light an entire city.

And it takes more of the same—knowledge—to convert oil into solar-power-enhancing additives: fertilizers and pesticides, both of which help us use less sun to put more food on the table. It takes still more knowledge to breed and bioengineer high-yield crops, develop growth hormones for our livestock, use better preservatives, package in spoilage-retarding plastic, and irradiate our food—which all promote the same efficiency: more usable food from less sun. These are the technologies, in other words, that have so dramatically increased the useful yield of each acre of farm or range. And overwhelmingly, they have emerged from the great centers of learning—established, of course, in the metropolis.

The city itself is all the more kind to the environment, because it has so completely rejected the policies that the green establishment holds dearest. It shuns “renewables.” The city isn’t animal or vegetable; it’s mineral.

Start with construction. The city certainly favors non-renewable resources here, and about that, at least, the green establishment remains silent, as it should. America currently harvests about 240 million tons of wood off the land each year, almost all of it for construction. The city, however, prefers to build with the three-dimensional resources, steel and concrete. Those materials can hold up a skyscraper; renewable wood can’t. Even if it could, nobody imagines that it would be greener to build with materials harvested from the living surface, no matter where the trees grew, no matter how delicately they might be harvested. The way we build things now, a comparatively tiny area of land yields, from far beneath its surface, all the mineral resources that it takes to build a city. You can’t get any greener than that.

The energy picture looks much the same. There’s no way the city could ever adopt the green establishment’s “renewable” path to energy. Manhattan is never going to heat its buildings or power its computers with rooftop solar cells, biomass, or windmills. There’s nowhere near

enough rooftop or wind, and no biomass to speak of, other than the mass of the people. Live on a good-size spread in the country, and harvest it aggressively, and you can plausibly imagine living off the renewable sources of energy the greens so strongly favor. Live in the city, and you can’t, not on your own acres. You have no acres. Nevertheless, you have tremendous energy efficiency when your energy comes from an oil well and a refinery and gets delivered by a tanker: the supplies are highly concentrated to begin with, and it takes relatively little energy to deliver them to a highly concentrated point of use, like a city.

Cities have become environment-friendly by rejecting the greens’ food policies, too—the policies that emphasize organic farming, free of bioengineered seeds and man-made fertilizers and pesticides. When food is grown or raised in the agricultural counterpart to the oil well—the mammoth factory farm, outfitted with every high-tech innovation—it takes relatively little land to produce it in the first place, and it takes little additional energy to deliver it to the tightly packed city.

Three-dimensional resources perfectly complement the three-dimensional city: they are as concentrated in their production as the city is in its consumption. The city is green not only because its residents occupy little land, but because its non-green sources of building materials, fuel, and food—and their delivery systems—can be frugal with land, too. Adopt the greens’ energy policies and we’d be blanketing the rest of the state with solar cells and cornfields just to fuel New York City.

As steel-for-wood trade-offs make clear, the city isn’t green because it uses little stuff overall, but because it uses little of the stuff that must be culled from the surface of the land outside the city. The Sierra Club labors to convince itself that city dwellers actually use less of a whole grab bag of “resources”: copper pipe, heating fuel, postal delivery, and personal cars, for example—an endless catalog of things said to be scarce, dangerous, prone to pollute, or otherwise hostile to the planet. But this kind of accounting is a distraction. If performed honestly, it inevitably leads

to the environmentally ruinous conclusion that living in the country is greener, all in all, than living in the city.

To begin with, any honest accounting of copper, fuel, and such must surely allow for the serious inefficiencies that congestion causes. The city may be efficient as long as you are sitting still, but the moment you try to move—yourself to the Met, or a sofa to your apartment—you find that the city is not efficient at all. A city at rest (an utterly oxymoronic notion, of course) may be frugal with its resources, but a city in motion never can be, because the friction is so high. Driving a car fewer miles is no great virtue in city traffic; ten cars idling in gridlock can burn fuel quite as fast as a single car does cruising down a wide-open highway. Green bookkeepers count efficiency as a very serious credit in almost all other contexts, so why not give green credit to the “efficient” country over the city, too, for its free-flowing traffic?

It gets worse. Being the center of capital and knowledge that it is, the city makes its inhabitants much richer than their country cousins. And when all the accounts are finally in, richer people invariably consume more of just about everything. If you’re not spending your extra wealth to heat your apartment on the Upper East Side, then you’re probably spending it to vacation in the snow farther west, in Aspen. If you don’t drive a car much in the city, you probably fly more planes out of it. Moreover, you may not consume much copper and fuel yourself, but Saks and the Met consume some on your behalf; so do taxi drivers and delivery trucks and airplanes. To find out how much you and your neighbors consume in this indirect way, you don’t have to whip out a tape to measure copper pipes. Just measure spending. And city dwellers spend more, because they have more to spend.

The only thing they evidently don’t get with their higher wealth is more land. Rich as they

are, they can’t afford to. A rather small area of virtual land 12 stories above the edge of Central Park costs far more than a farm and 100 acres in Vermont. Life in the city is incontestably frugal with the one thing that should eclipse all others in environmental discourse: land.

By building the city up out of non-renewable resources, by heating and lighting it with non-renewable fuels, and by feeding it with non-organic foods preserved with chemicals or plastic packaging, the city returns acre upon acre of

land in the country to wilderness, the greenest accomplishment of all. And in doing that, the hard city and its hard fuels take care of a lot of pollution, too. Nature has enormous power to cleanse and restore; freeing up 95 million acres to be reclaimed by water-

shed and forest has surely done more to clean water and protect birds than the curtailing of pesticides ever achieved. The best estimates at hand likewise indicate that forest regrowth in America currently recaptures all the carbon and then some that America releases into the air in burning fossil fuels.

With food and fuel, the greens keep trying to spread things back out again—that’s the whole thrust of the food and energy policies they so tirelessly promote. It’s a mistake. But, contradictorily, their plan to improve on the city is to pile it up all the higher—by collaring and quarantining the metropolis and choking off suburban sprawl. That’s a mistake, too.

The organic growth of the city is what has made possible the greening of the country. Manhattan itself would be greener today if its sprawl had been collared off about mid-island in 1840, but the Empire State wouldn’t be, nor would the rest of America. The city absorbs people, enriches them, affords them the confidence and security to have smaller families, and generates the capital and knowledge that move the

“The city is frugal with the one thing that should eclipse all others in environmental discourse: land.”

How Cities Green the Planet

production of food and energy off the land and into the third dimension.

Suburbs may indeed consume more material resources than cities; they certainly consume more land. But rural living consumes even more land: land is the one thing rural life tends to consume in profligate excess, because the country is the one place where land is really cheap. Viewing the suburb as mere spillover from the city is just plain wrong, demographically speaking. On their own cities don't spill out; they collapse in, because on their own cities have negative population growth. Cities grow not because they sprawl out from the center, but because they draw people in from the periphery—the distant periphery, far beyond the suburbs.

If bad policies do somehow manage to collar the city with an impregnable ring of green, the city will stop drawing people in from the country and begin sending them back out instead. As cyber-visionaries keep telling us, one doesn't have to stay in the city anymore to stay at the center of the new economy; the virtual city is where it's at, and given the choice, quite a few people may happily bid the concrete city good-bye. Chips and communications networks are centrifugal technologies; they make it easier to spread apart. They are very powerful already and grow more so month by month. In these circumstances, the most likely effect of collaring the city will be to spin people out farther still, well beyond the suburbs. "[T]he digital world [will] redistribute jobs and wealth, so that the concentration of opportunity need not parallel the concentration of people," declares cyber-pundit Nicholas Negroponte in *Wired*. "[T]he flow of people will be out of, not into, cities. . . . Being rural could become synonymous with being rich." Bad news for the city, if he's right. And even worse news for the wilderness.

Happily for the environment, Negroponte's digital diaspora hasn't shown up in any hard demographic data yet. And it won't, not so long as there remains the option of the healthy suburb—something most people find even more attractive than rural solitude. So long as city and suburb continue to prosper and grow, the centripetal attractions of the city will overcome the centrifugal power of bits. Indeed, as one of us has argued in

these pages previously ["New York, Capital of the Information Age," Winter 1995], gigabit links to the rest of the planet could well make Citicorp, Saks, and the Met more dominant than ever, by letting them project their top-of-the-heap talent even further outward than they do today.

The right perspective is to view suburbs and city as a single economic entity, growing organically together. The suburbs wouldn't exist but for the city and its jobs and money. The city can't survive without its suburbs, which is where the human capital finds refuge from the city's worst excesses and pathologies. Without capacious suburbs, the city will simply lose altogether the people who provide the capital and knowledge that make cities so efficient: no green collar will ever persuade such people to live in places with lousy schools and high crime.

The real threat to the environment isn't that the city will continue to grow, but that it won't. The suburbs are the best defense against the rural alternative, an alternative made newly attractive today by the decentralizing technologies of the information revolution. The suburb is the buffer that lets the married with children stay near the city when they tire of living right in it, leaving room for new young immigrants in the heart of the city itself. Collar the city, halt its natural slope into suburbs, and the young, well-wired digirati may choose the country instead, as soon as their kids arrive. The city will lose, and the wilderness will lose too.

There was abroad, at one time, the notion that cities grew parasitically off the countryside, that all economic wealth derived from the land, and that the city grew rich only by expropriating the bounty of honest folk who tilled the soil. If this were ever true, it's no longer true today. The industrial revolution severed half the links between wealth and land; the information revolution has severed most of the rest. Wealth now springs from the third dimension, beneath the surface, and from the fourth, the boundless caverns of the mind. The city, its capital, and its knowledge are the fonts of those kinds of wealth. Their ultimate effect is to make land far from the city uneconomic. Which returns it to wilderness, 100 percent green. ■



The Fiscal Impacts of Different Land Uses: The Pennsylvania Experience

Introduction

How land is used in your community affects your taxes and your quality of life. It affects the size of the local government, the types of services it offers, the type of equipment it must purchase, and the taxes and tax rates it must levy. It also affects the number of students in the local school district, the size and number of school buildings, the number of teachers, and the taxes and tax rates the school district levies.

These impacts are important for you to understand because they affect taxpayers, local residents, and the ability of local governments to respond to the needs of its citizens. Identifying the impacts of different land uses helps identify what types of land development and uses should be encouraged in your municipality, and what types should be treated cautiously.

Potential Impacts

Land uses can affect the local government's and school district's finances by changing the revenues that are collected or the amount of public money that is spent on services. A housing development which is home to many children, for example, may generate a lot of tax revenue for the municipality while also necessitating the school district to operate more classes.

Sorting out the net impact of different land uses requires considering the impacts on both revenues and expenditures.

Impacts on Revenues

The revenues collected by several local taxes, such as the real property and realty transfer taxes, are directly dependent upon the land uses occurring in a jurisdiction. High value uses, such as industrial, commercial, or expensive homes can generate a lot of tax revenue.

Other local taxes are less directly dependent upon land uses but are still influenced by them. Revenues from the earned income tax, occupation tax, and the per capita tax are heavily influenced by the number and economic status of the people who live in the jurisdiction.

How people use land also affects non-tax revenues of municipalities and school districts. These include revenues from licenses and permits, sewer and public service fees, highway aid, the amount of money school districts receive from the Commonwealth's Equalized Subsidy for Basic Education, and payments in lieu of taxes made by the Commonwealth and federal governments.

Impacts on Expenditures

The amount of revenue which can be raised is only part of the overall fiscal impact of different land uses. The cost of providing local governmental and school district services to different land uses is also important.

Such services can include sewer, water, fire protection, police, refuse collection, streets, libraries, and recreational facilities. School services can include adult enrichment and high school equivalency courses, as well as educating children.

The Net Impact

The overall fiscal impact of a land use depends upon both its revenue and expenditure impacts. A land use may generate a lot of revenue for the local government, for example, but if the services it requires cost the municipality and school district even more than this revenue, it will end up costing the local taxpayers. It is only by considering the revenues and expenditures from a land type that you can identify its overall impact.

The Pennsylvania Experience

The experiences of three Pennsylvania townships illustrate the potential fiscal impact of land uses in your own municipality. These townships include a township with several large agricultural processing firms (Bethel Township, Lebanon County); an agricultural township which is increasingly becoming a bedroom community for Harrisburg and which prides itself on having the lowest real estate taxes in its county (Carroll Township, Perry County); and a rural township with a large commercial area (Straban Township, Adams County).

The fiscal impact of different land uses in 1990 appear in Table 1. These ratios compare revenues to expenditures, and were calculated using the townships' and school districts' budgets. It is important to note that homes on farms were considered residential properties in these ratios, and that farm and open land was just the land itself without buildings.

In these townships, residential land on average contributed less to the local municipality and school district than it required back in expenditures. In Bethel Township, for example, for every dollar in revenue from residential land, \$1.08 was spent on services to that land (see Table 1). In all the townships, residential land required more from the school district and township government than it contributed. Much of this negative fiscal impact occurred because of school expenses.

Commercial, industrial, and farm/open land, in contrast, provided more than they required back in expenditures. In Bethel Township, for example, for every dollar of revenue from commercial land, only \$.07 was spent on services to that land. Commercial, industrial, and farm and open land contributed more to the local municipality and school district than they took, and thus helped subsidize the needs of residential land.

In other words, residential land in general costs local taxpayers, while commercial, industrial, and farm/open land helps taxpayers by paying more than they require back in services. These results are consistent with the experience in other states.

Implications

Implications for Taxpayers

Homeowners benefit from the industrial, commercial, and farm/open land in the local taxbase because these other land uses help subsidize school expenses. The relative amount of this subsidy depends, in part, upon the composition of the taxbase. The more of this non-residential land in a municipality's taxbase, the more that these land uses help subsidize school expenses, and thus the less that homeowners must pay.

Table 1. Cost of Community Service Ratios by Land Use

	Residential	Commercial	Industrial	Farm & Open
Bethel Township (Lebanon County)	1 : 1.08	1 : .07	1 : .27	1 : .06
Carroll Township (Perry County)	1 : 1.03	1 : .06	-	1 : .02
Straban Township (Adams County)	1 : 1.10	1 : .17	1 : .05	1 : .06

Implications of Growth

Residential development in general does not pay for itself. Other land uses must help subsidize school expenses. Residential development may increase the tax revenue which can be raised, but it increases costs even more. Current residents may end up paying higher taxes to cover the costs associated with new residents.

If growth must occur, commercial and industrial development have a potentially beneficial impact on the tax base as long as they do not dramatically raise the demand for services. The taxbase increases from such development can expand property tax revenues, potentially paying for new service demands. New tax revenue from such development can even reduce the tax burden on other properties if the need for services does not increase.

Implications of Decline

When a community's major industry (such as the town steel mill) closes due to economic difficulties, the assessed value of that property can decline, reducing tax revenues. Water and sewer fee revenues can also decline drastically, making it difficult to operate the local systems without increasing usage fees to homes and businesses.

Because industrial and commercial land types in general are helping subsidize homeowners, loss of their revenue can be especially damaging. The school district and municipality may be forced to choose between cutting services or raising tax rates to make up for the lost revenue. If a school district or municipality relies too heavily upon a large commercial or industrial property to fund local services, it leaves itself vulnerable to these kind of shocks.

Implications for Farmland Preservation

Some residents may not appreciate the smells, sounds, or other inconveniences of living near farms, but these results suggest that all residents benefit from farm and open land. The property tax revenue from these lands helps keep residents' taxes low. Farm and open land in the case study townships, for example, provided

\$312,181 to their school districts. This is above and beyond the property taxes farmers paid on their buildings and homes.

When farmland is converted to residential purposes, these benefits are lost. If the number of children in the new houses requires the school district to hire new teachers or build new schools, or the local government to increase service expenditures (such as roads, sewer or water), the impact of farmland loss can be especially dramatic. The land will be converted from a net contributor to the municipality and school district into a net drain.

Some farmland protection programs, such as Act 319 (also known as "Clean and Green"), reduce the amount of real estate tax paid by farmers. This lessens the revenue that farmland contributes to the school district and municipality. The results in Straban Township, which had land enrolled in Act 319, demonstrate that even when these programs are in use in a township, farmland still contributes more than it requires. Even with preferential assessments, farmland ends up subsidizing the educational costs of residential land and plays a positive economic role in the community.

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Facts and Trends

The pressure of humanity

The link between population, environment and economic development is very complex. If we could clearly identify the different factors, then we might understand how to prevent the problems that ensue from this relationship. One thing is certainly obvious: concentrations of population, misuse of national resources, poverty and lack of any control cause environmental degradation. However, a better level of education, healthcare and nutrition as well as scientific and technological progress would definitely make a solid contribution to the better use of natural resources. Recent developments in three areas (control of birth rate, life expectancy and standards of living) in several regions of the world are important indices of their future demographic trends. How does Europe compare?

Austria, Finland and Sweden recently joined the European Union, which had hitherto been one of the most densely populated areas in the world with 147 inhabitants per km². The addition of the immense Scandinavian territories (27% of the EU's surface area with only 6 % of its total population) reduced this figure to 114 inhabitants per km². The distribution of the EU's population is, however, extremely unequal. The density in Finland is a mere 15 inhabitants/km², rising to 331 in Belgium and 372 in the Netherlands. Some 20% of Europe's 370 million citizens live within 4% of its territory, primarily in the highly urbanised industrial areas and along the coasts. This has inevitably created a concentrated release of pollutants into the environment and has led to the development of all related infrastructures and networks in society: transport, telecommunications, electricity etc.

One important response to these problems lies in the approach we take to planning and how we use the land. We can see this in the Netherlands for example which has the densest population in Europe whilst en-

joying vast areas of green belt and open spaces.

Well-informed and more aware, Europe's citizens, as consumers, can make more responsible and better-informed choices which can reduce the pressure on our environment.

Profile

Higher standards of living are the fundamental cause for the growth of material consumption in Europe which has grown spectacularly in the last 40 years. A second factor has been the overall growth of population in that period, some 17 % since 1964 despite a levelling off of the birth rate in recent years. The average European also lives longer (to an average age of 72 for men and 79 for women). As the number of pensioners has rapidly increased so has the desire to travel. Retired people have plenty of free time and in many cases are better off financially than their juniors. This makes them important consumers of leisure services and holidays. The sharp increase in European consumption of goods and services can also be

attributed to other factors, including shrinking average households (more people living alone).

Struggling to keep up

Europe actually stands out from the rest of the world for its lack of demographic dynamism. In 1993, net population growth in the EU ranged from 5 for every 1,000 inhabitants in Ireland to -1.2 in Germany. The recent collapse in the birth rate in Spain, Greece, the Netherlands and Ireland will further accelerate the relative ageing of the population in those regions.

2 out of 3 citizens are town-dwellers

Recent decades have seen the closure of many farms and the loss of 2 million jobs in rural areas. This has significantly altered the pattern of population distribution. The amount of land under cultivation has declined steadily in Europe since the beginning of the 1960s. Conversely, reforestation and natural tree growth led to a 10 % increase in forested area over the same period. Virgin land or properties abandoned by bankrupt farmers and rural workers drawn to the city have often been bought up and used to build new homes and businesses, infrastructure or recreational facilities.

The growing imbalance between town and countryside has led to increased consumption of energy and transport. It has been calculated that the combined effect of urbanisation and mobility in Europe's most densely populated countries causes built-up areas to increase by 2% every 10 years. It has also been estimated that the road network already consumes 1.3% of the European Union's total land area compared to a mere 0.03% in the case of rail.



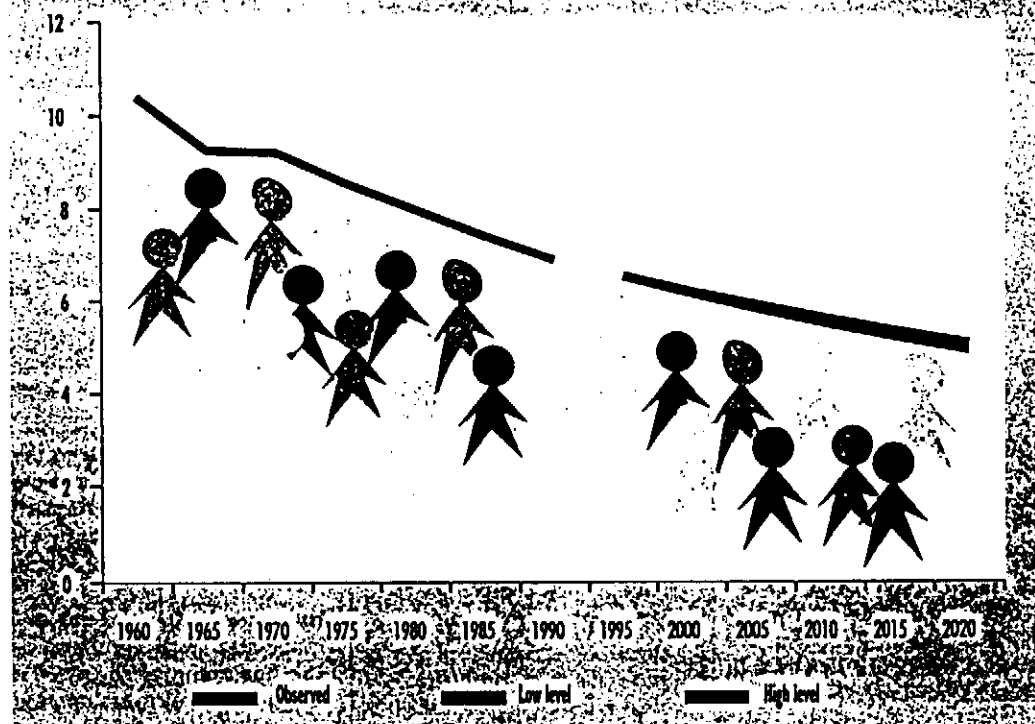
POPULATION AND LAND USE

Europe in action

New approaches

Source: Eurostat

The EU's share of total world population (%)



Europe's industrial landscape has changed a great deal over the past 20 years. Heavy industry has declined (a process that began somewhat later in the East) and the service and high technology sectors have increased in growth tremendously. These changes, together with measures taken in the field of energy efficiency have helped the EU make important progress over the past 20 years in terms of the efficiency of energy consumption.

Everything we produce and consume has an impact on the environment. Above all, it is the way goods are produced that decides

The urban settlement constantly increases at the expense of the rural settlement
(Housing in the Isle of Dogs, London, United Kingdom.)

POPULATION AND LAND USE



how big this impact will be. The explosive increase in oil prices in the early 1970s, growing environmental awareness and the introduction of the first environmental regulations forced Europe to restructure economically. Technological advances have also occurred in the three main fields of energy-saving, material substitution and pollution control. This is clearly apparent when we review the pattern of industry's energy and raw material consumption in recent decades (the rate of energy use measured in terms of gross domestic consumption per unit of GDP has been reduced by 25%). A similar picture appears through the explosion of new businesses working in the field of environmental protection. What's more, the breakthrough of information society technologies could ensure better management of natural resources and more effective pollution control in the future.

No doubt that by the end of the 1990s, all the most effective steps in this field will already have been taken. In other words, if the European economy and population continue to grow at the present rate, the measures we will have to introduce in the future to maintain or reduce current emission rates will be increasingly complex and onerous. For that reason it is important we act quickly.

Managing our land more effectively

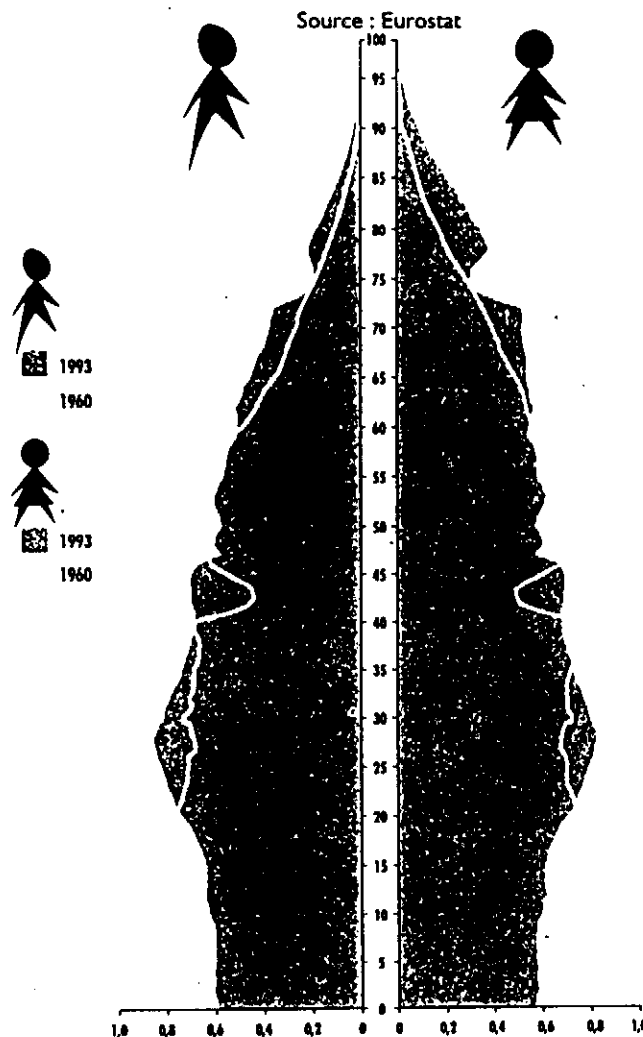
The EU has redoubled its efforts to support

effective and more integrated town and regional planning policy. It is well known that simply providing structural funds is no longer enough, nor completely efficient, especially as the results of such investments can be environmentally damaging. The current priority is to sketch the outlines of Europe's future expansion, part of which entails implementing the Europe 2000+ report (1994) which laid the foundations for cooperation

in the field of European land development. The report places particular stress on the need to protect the environment, safeguard biodiversity and manage natural resources prudently. It also emphasises the need for cross-border, inter-regional and transnational cooperation within the EU itself and with neighbouring countries if we are to achieve our shared objective of promoting sustainable development.

A drop in the birth-rate shows up as a reduction at the base of the pyramid. At the same time, however, the apex is rising because people are living longer. What we see here is two processes acting at the same time.

Demographic pyramid in the EU : comparison between 1960/1993 (% of world population)





POPULATION AND LAND USE

Taking responsibility

PRIORITY OBJECTIVES

- Introduce measures to improve energy efficiency.
- Enhance processes and technology.
- Improve pollution control.
- Reduce emissions and discharges.
- Introduce environmental management tools (LCA).

The impact of development

The quality of the environment and the growing concentration of population are a clear challenge for our societies. Simply defining these two factors more effectively would go a long way towards a clearer picture of a more symbiotic relationship between our civilisation and nature.

Town and country planning is frequently used as an instrument for protecting the environment. Plans can be drawn up at national or regional level, but the system generally operates at local level. Some states use sector plans incorporating specific ecological objectives,

such as programmes for restoring environmental damage in eastern Germany, land-use plans for coastal zones in Portugal, regional plans for discharge points in the Netherlands and plans for integrated transport management in Austria. The public is increasingly involved in the drafting of these plans - a factor that has been the norm in recent years for Northern Europe and which is now also spreading to the countries of the South, as demonstrated by Portugal's recent national environment plan.

Physical planning has to be seen as one aspect of an overall strategy of environmental policy. Denmark, France, Ireland, Norway, the Netherlands and the UK have all risen to the chal-

Soaring growth rates

The impact of demographic and economic growth on the well-being of our planet has been measured in the following terms:

- Tripling of the population over the last 100 years and a doubling in the last 40;
- 20-fold increase in economic activity;
- 50-fold increase in the consumption of fossil fuels;
- 50-fold increase in industrial output.

lenge, drafting Green Plans for the year 2000. The basic idea in each case is to address environmental problems at their source, taking them directly into account when formulating national policy and the codes of conduct to be pursued by the various sectors of business.

Quality of life, an objective to reach in the cities as well.
(The Grand Place in Bruges, Belgium)





Seminar Publication

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The Role of Landscapes in Stormwater Management

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Abstract

This paper presents evidence that many existing streams did not have conspicuous channels and were not identified during presettlement times (prior to 1830s in the midwestern United States). Many currently identified first-, second-, and third-order streams were identified as vegetated swales, wetlands, wet prairies, and swamps in the original land survey records of the U.S. General Land Office.

The data presented show that significant increases in discharge for low, median, and high flows have occurred since settlement. Stream channels have formed inadvertently or were created to drain land for development and agricultural land uses. Currently, discharges may be 200 to 400 times greater than historical levels, based on data from 1886 to the present for the Des Plaines River in Illinois, a 620-square-mile watershed. Historic data document how this river had no measurable discharge or very low flow conditions for over 60 percent of each year during the period from 1886 to 1904.

This study suggests that land-use changes in the previous upland/prairie watershed have resulted in a change from a diffuse and slow overland flow to increased runoff, concentrated flows, and significantly reduced lag time. Preliminary modeling suggests the following results: reduced infiltration, reduced evaporation and evapotranspiration, greatly increased runoff and hydraulic volatility, and increased sediment yields and instream water quality problems caused by destabilization of streambanks.

The opportunity to emulate historical stormwater behavior by integrating upland landscape features in urban developments and agricultural lands offers stormwater management options that are easier to maintain, less expensive over time, attractive, and possibly more efficient compared with many conventional stormwater management solutions and the use of biofiltration wetlands.

Introduction

Diverse and productive prairies, wetlands, savannas, and other ecological systems occupied hundreds of millions of acres in presettlement North America. These ecological systems have been replaced by a vast acreage of tilled and developed lands. Land-use changes have modified the capability of the upland systems and small depressional wetlands in the uplands to retain water and assimilate nutrients and other materials that now flow from the land into aquatic systems, streams, and wetlands. The historical plant communities that were dominated by deep-rooted, long-lived, and productive species have been primarily replaced by annual species (corn, soybeans, wheat) or shallow rooted non-native species (bluegrass lawns, brome grass fields). The native vegetation was efficient at using water and nutrients, and consequently maintained very high levels of carbon fixation and primary productivity. Modern communities, in turn, are productive but primarily above-ground, in contrast to the prairie ecosystem where perhaps 70 percent of the biomass was actually created belowground in highly developed root systems. These changes in the landscape and vegetation coupled with intentional stormwater management have changed the lag time for water to remain in uplands and consequently the rate and volume of water leaving the landscape.

The Des Plaines River

Changes that have occurred on the uplands and how these changes have affected the hydrology of wetlands and aquatic systems can be illustrated using historical and more recent data to illustrate trends in discharge of major river systems. The Des Plaines River was chosen as a study watershed because of available historical data and trackable changes in watershed land uses.

The Des Plaines River originates southeast of Burlington in southeastern Wisconsin, flows for over 90 river miles through agricultural, urban, and suburban landscape through northeastern Illinois and the Chicago

region, then flows west and south, meeting with another river and becoming the Illinois River. The historical data presented are from a case before the Illinois Supreme Court and a circuit court (U.S. Department of War vs. Economy Power and Light, 1904) that dealt with the navigability of the Des Plaines River. The data were derived from a gauge station installed and operated at present-day Riverside, Illinois, from 1886 to 1904. The U.S. Geological Survey has maintained this same station since 1943. Historical data from 1886 to 1904 include a single-stage measurement per day and weekly discharge measurements (rating curves). For our studies, duration flow curves were created for the years 1886 to 1904 and 1943 to 1990. The data were compared using median values of discharge (50 percent) and also using low and high levels of discharge as indicated by the 75 percent and 10 percent values derived from the annual duration flow curves 1886 to 1904 and 1943 to 1990. The watershed area gauged at Riverside is approximately 620 square miles (400,000 acres).

In the late 1800s, about 40 percent of the watershed had been tilled and/or was developed. In contrast, approximately 70 to 80 percent of the watershed is now developed or under annually tilled agriculture land uses. Annual duration flow curve values based on linear regression analysis suggested very significant increases in discharge since 1886; perhaps 250 to 400 times (Figure 1). In 1886, the median discharge was 4 ft³/sec. In contrast, in recent years the median discharge has been 700 to 800 ft³/sec. Trends in low, medium, and high flow values for the Des Plaines River have undergone very significant increases.

Preliminary watershed hydrologic modeling suggests that the watershed and discharge data for 1886 to 1904 had already been modified by development and agricultural land uses; the Des Plaines River watershed was settled in the late 1830s, and thus 50 years of land use and development had passed before the 1886 data were collected. Other data resulting from the litigation suggested very clearly that the discharge of water from the Des Plaines River was significantly less between 1886 to 1904 compared with present day discharge. Because the litigation contested navigability, evidence was presented using daily stage, discharge, and water depth data on the opportunity for commercial navigation on the river. The data suggested that between 1886 and 1904, for an average 92 days per year, the river had no measurable discharge. An additional 117 days per year, the river had 60 ft³/sec or less discharge, which was equal to a depth of less than 3 in. at Riverside. Based on these statistics, over 60 percent of the year the 400,000 acre watershed yielded no water or such low flows that navigation was not possible or reliable. Another 10 to 25 percent of the year the river was covered with ice.

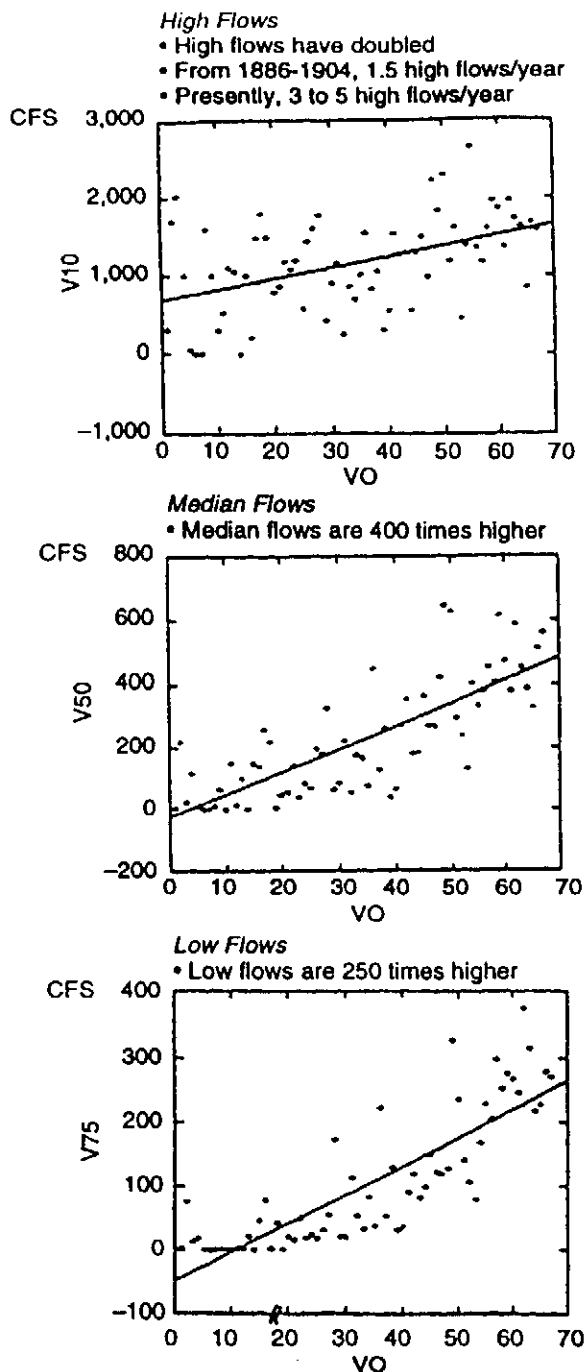


Figure 1. Linear regression analysis and raw data plots of Des Plaines River discharge at Riverside, Illinois, 1886 to 1988. Low, median, and high flow data were derived from duration-flow curves for 75, 50, and 10 percentile annual flow levels (1).

Additional supporting evidence of the significance of changes in the watershed and river is available. The original land survey records for parts of the Des Plaines River where section lines were surveyed identified that reaches of the river had no discernable channels. Where channels now occur, in the 1830s surveyors found wet prairies, swamps, and swales but usually no conspicuous or measurable channel widths. Channels and

"pools" were identified in some locations and with greater frequency downstream in the watershed. The original land surveyors were under contract by the U.S. Government Land Office to document the vegetation types covering the land and to identify, where possible, the widths and depths of streams when they were encountered during the process of laying out the section lines.

Conclusions and Applications of the Findings

These data suggest very clearly that highly significant changes in the hydrology, hydraulics, and water yield from the Des Plaines River watershed have occurred since settlement. Other major river and watershed systems have yielded similar results, suggesting the transferability of the concepts and general conclusions reached from the studies of the Des Plaines River. These findings and their applications are discussed below.

Natural Ecological System Functions and Processes Should Be Emulated

Water Yield

The historical landscapes "managed" stormwater very differently than it is managed by present-day strategies. Historical data clearly indicate that a relatively small percentage of the precipitation in a watershed actually resulted in measurable runoff and water leaving the watershed. In fact, preliminary analysis suggests very strongly that an average 60 to 70 percent of the precipitation in the watershed did not leave the watershed from the Des Plaines River; this water was lost through evaporation and evapotranspiration. Analysis predicts that approximately 20 to 30 percent infiltrated and may have contributed indirectly to base flow in the streams and directly to base flow in wetlands in the watershed. During a full year, the balance of the water directly contributed to flow in the "river," where an identifiable river channel now occurs.

Present-day water management strategies involve collection, concentration, and managed release of water. These activities are generally performed in developed parcels in the lower topographic positions. Historically, a greater percentage of water was lost through evaporation and evapotranspiration from upland systems. In these situations, microdepressional storage and dispersed rather than concentrated storage occurred. Weaver (1) documented the ability of the foliage of native perennial grassland vegetation to intercept over an inch of rain with no runoff generated.

Sediment and Pollutant Management

Because many pollutants in stormwater require water to dislodge and translocate the suspended solids to which they are adsorbed, there is a great opportunity to emulate historical functions by using upland systems to perform biofiltration functions, increase lag time, and reduce total volume and rate of runoff.

Increased discharge and velocity of water moving through channels has been documented to greatly affect instream water quality. Perhaps as much as 70 percent of instream sediment loads come from channel and bank destabilization associated with the higher velocity waters and with solifluction and mass wasting of banks after flood waters recede (2). Stabilizing (or at least reducing) hydraulic pulsing in streams can best be accomplished by desynchronization and reduction of tributary stormwater volumes and runoff rates from uplands. This can be accomplished by integrating substantial upland perennial vegetated buffers throughout developments and agricultural land uses. Buffers are designed not only to convey water and minimize erosion (i.e., grassy waterways) but also to attenuate hydraulic pulsing, settle solids and adsorbed nutrients, and reduce and diffuse the velocity, energy, and quantity of water entering rivers, wetlands, and other lowland habitats. Using upland microdepressional storage, perhaps in the form of ephemeral wetland systems and swales in the uplands, also would emulate the historical landscape conditions and functions.

Applications

Several example projects of "conservation developments" are now being completed, which integrate up to 50 to 60 percent of the urban development as open space planted to perennial native prairie, wet swales, and other upland communities (as site amenities). Hybernica is a 132-acre residential development in Highland Park, Illinois, designed and constructed by Red Seal Development Corporation, Northbrook, Illinois. Empirical data from Hybernica suggest that the use of upland vegetation systems in combination with ponded areas has resulted in the rate and volume of discharge being essentially unchanged before and after development. Another project, Prairie Crossing, is a 677-acre residential project designed to offer comprehensive onsite stormwater management in uplands and created lake systems. Extensive upland prairie and wet swale systems biofilter runoff and enhance the quality and reduce the quantity of water reaching wetlands and lakes in the development.

In these types of projects, upland vegetation takes several years to fully offer stormwater management benefits. In planted prairies, surface soil structure develops a three-dimensional aspect in 3 to 5 years. The development of this structure seems to have an important role

both in offering microdepressional storage and increasing the lag time for retaining water in upland systems.

Restoration and native species plantings also have provided benefits where ecological system degradation has led to increased water and sediment yields. Where ecological degradation is occurring indirectly because human activities on the landscape have reduced or eliminated major processes (such as natural wildfires), restoration can provide vegetation and stormwater management benefits. Wildfires have been all but eliminated since human settlement has occurred, especially in areas that contain forests, savanna, or oak woods. In the absence of fires in many oak woods and savannas, a dense shading develops caused by increased tree canopy and dense shrub development. Where this has occurred, a reduced ground cover and soil stabilizing vegetation grows under the low-light conditions. Consequently, highly erodible topsoils containing the seeds, roots, and tubers of the soil stabilizing vegetation and higher volumes and rates of water can run off from these degraded savanna sites. The process of savanna deterioration has been documented; restoration has used prescribed burning and other strategies (3-5). Reestablishment of ground cover vegetation is key to reducing runoff, improving water quality, and reestablishing an infiltration component in degraded, timbered systems.

Should Wetlands Be Used for Sediment Management, or Should This Occur on the Uplands?

Because wetlands often provide what little wildlife habitat remains in developed landscapes, and because they are attractive to wildlife, their use for stormwater management must be carefully considered. Currently, a national movement is afoot to use created (and often natural) wetlands for stormwater management and biofiltration. Many studies of existing high-quality wetlands, however, provide little or no evidence that they historically served important biological filtration and sediment management functions. Sediment deposition was generally episodic (e.g., after wildfires), was of short duration, and yielded small sediment loads compared with loads from present-day agricultural and developed lands.

Use of wetlands for biofiltration can actually aggravate existing problems for many wetland wildlife species. For example, in the Chicago region it is not unusual to find 100 to 200 parts per million lead (and other contaminants) in tadpoles (especially in frog species with a 2-year tadpole stage, such as leopard frogs, bullfrogs, and green frogs) found in wetlands receiving highway stormwater. It is imperative to understand the potential long-term toxic effects on biological systems associated with stormwater management in wetlands and contaminant mobility.

Proposals have been made to allow the materials concentrated in biofiltration wetlands to simply be buried by each additional sediment load or to be intentionally buried by adding additional soil. Contaminant mobility through biological pathways still occurs, however, from beneath considerable sediment burial. In fact, in the Great Lakes, contamination from PCBs that are often several feet below the surface of the sediments have contributed to major increased mortality rates and major morphological problems in predaceous birds such as cormorants, terns, and gulls (6, 7). The literature on wetland biofiltration inadequately addresses contaminant mobility routes through biological systems and the potential threat to the viability of biological systems. Because wetlands are so attractive to biological organisms (and, in fact, the biological organisms are often key to the successful functions of the biofiltration wetlands), it is necessary to rethink and carefully design biofiltration wetland systems in the future.

Far too often, people view the lowland environments (i.e., rivers, wetlands) as the locations for treating or physically removing problems created in the upland environments. The studies briefly described in the previous section, however, suggest that stormwater, sediment loads, and the varied contaminants may be best managed on upland systems. Although the land cost for using upland rather than lowland environments for stormwater management may be higher, the efficiency and reduction in potential contaminant problems may be greater. A landscape with many upland microdepressional storage opportunities and a large buffering capacity might offer more efficient processing than would a single biofiltration wetland at the downstream end. Each buffer or depressional wetland would need to treat a smaller volume of water and contaminants. Also, upland or dispersed stormwater treatment facilities would have significantly reduced long-term maintenance costs and represent a more sustainable approach to management of stormwater. Centralized biofiltration wetlands, on the other hand, have high maintenance requirements and potential problems that include decreases in removal efficiency for some materials in the short and long term.

There Are No Controlled Year-Round (and Long-Term) Studies of Removal Efficiencies Comparing Uplands and Wetlands

The stormwater treatment literature indicates that use of wetlands and measurements of removal efficiencies have been based primarily on removal during storm events passing through the biofiltration wetlands. Year-round contaminant mass-balance data are largely unavailable. Nongrowing season studies have documented the export of materials to be significant; consequently, removal efficiencies for some materials (e.g., metals, phosphorus) are not likely to be significantly reduced from what has been documented for

storm event sampling. Wetland efficiencies need to be experimentally controlled and compared with upland removal efficiencies, which also have not been studied in detail (with the exception of removals for several key elements such as phosphorus). The ability of upland (soil colloids) systems to provide reliable and long-term binding and retention for many contaminants has been demonstrated (8).

Acknowledgments

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A National Symposium

Assessing the Cumulative Impacts of Watershed Development on Aquatic Ecosystems and Water Quality

(p. 181-187)

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On Conservation Developments and Their Cumulative Benefits

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Abstract

Conventional urban developments typically modify 85% to 100% of the site's land and natural resources. Open spaces, and land vegetated by native vegetation, usually are included within highly manicured parks or detention basins—or as is more likely—they are excluded from projects altogether. "Conservation developments" have tended to do the opposite: development of 5% to 60% of the land occurs while 40% to 95% is retained as open space. This open space may include manicured parks, restored and remnants of native plant communities, as well as highly integrated programs for human use and enjoyment of the open space systems. This presentation will discuss the cumulative benefits of such developments. The benefits include water quality enhancements involving reduced sediment, contaminant, and water yields compared to conventional developments; wildlife habitat benefits; opportunities for providing significant protection of rare species and declining natural resources; human quality-of-life benefits; and recreation and education benefits. This presentation will provide examples of how known and predicted benefits derived from several conservation development projects have been integrated into residential development within an ecological restoration context on a landscape scale.

Introduction

Land development can be done differently. Recent trends in landuse and development impacting natural resource systems suggest that several alternative approaches to planning, design, and development provide added benefits to developers, landowners, and purchasers of the developed property. In the absence of planning that considers natural resources systems early in the development process, the following trends become evident on a regional (and national) basis"

- 1) decline in the area, quality, and ecological viability of open space;
- 2) decline in wildlife habitat area and quality of habitat that does remain;
- 3) decline in regional water quality;
- 4) increased flooding problems in association with increased impervious land-scape elements (flooding becomes more prevalent both within developed landscapes and in downstream environments);
- 5) increased incompatibility between developed landscapes and remaining natural areas, and open

- space systems (most areas of incompatibility are directly related to threats from points 1-4 above); and
- 6) increase in human discomfort, costs of living, traffic grid-lock, and costs per capita to maintain developed infrastructure.

This paper will briefly identify alternatives to conventional land-development that have been designed and incorporated into development projects for the mutual advantage of natural resources, human resources, the developed environment, and the financial community.

Fundamental Assumptions Directing Land Development

Most land developments are driven by short-term economics analyses and perspectives. Thus, they are designed conscientiously to minimize financial risk and provide a favorable return in a planned, relatively short period of time. Consequently, long-term economics, quality of environment and human quality of life issues generally have not been addressed by the short, often rushed, time lines assumed by many land developments. If not directed or constrained by "time value of money" relationships, land development is also fundamentally affected by land valuation and money lending institutions and their process for assessing risk. The land valuation and development risk assessment process is fraught with a myriad of assumptions which fundamentally need to change if environment and human quality of life issues are to be addressed in the development process with a realistic and longer-term perspective.

Basic to the changes required is a need to treat environment as an asset of value beyond the conventional real estate appraisal process—which, for example, might simply value a buildable lot with a large tree more valuable than a lot without the tree. This market driven valuation perspective needs to be balanced with a more fundamental valuation of the intrinsic ecological values of resources, open space, and an economic line item for the functional ecological values (such as the current free services delivered by natural resources for water quality enhancement). This valuation process might, for example, equate water quality cleansing on a landscape scale to the individual per acre contributions in each area proposed for development. Thus, an added cost would be associated with development that did not take this important function into consideration by protecting the basic opportunity for the land and natural resources to continue providing this function. We all pay, and at great cost, for neglecting the intrinsic and enhanceable functional values of ecological resources in the land development process. The economics of retrofitting water quality enhancements and flood management programs *post facto* are examples of societal and natural resource costs that need to be weighed into the valuation process for each development and lot.

Cumulative Ecological Impacts

For years, well-intentioned planning and engineering strategies have been used in the development of land. Throughout the country, and elsewhere, ordinances and regulations have guided the design and enforcement local, state, and national programs of development. These documents, largely viewed as restrictions, often have only provided fundamental guidance to control development impacts. Ecological impacts have not been adequately addressed through this strategy. Nor has compatibility of a development with adjacent open space, parks, and natural areas.

Collapse of Hydrological Systems

Because water flows downhill, changes on uplands can be gaged by measurement of changes in regional aquatic systems including rivers, lakes, wetlands, and regional groundwater/surface water relationships. As a general rule, measurements in these aquatic systems provide a useful index of the condition or ecological health of tributary uplands. Health is indicated by a change from conditions with healthy populations of fishes, invertebrates, and other conditions including good water quality and habitat conditions which support these organisms, as well as providing quality human recreational, water use, and educational and scientific opportunities. Prior existing data on biological and human-use statistics repeated measurements of the same variables, thereby contributing to an understanding and measurement of change in ecological health.

Using data from key river systems that have their headwaters in rural areas and traverse urban areas, we have learned that piecemeal impacts from changing landuses have resulted and contributed to large scale environmental impacts (Apfelbaum, unpublished data). Figure 1 provides an example of the resulting changes in hydrological systems. This interpretation suggests that regulations and ordinances (especially as they pertain to stormwater management) may not have worked as well as they could have. Increasingly frequent flooding, impaired human uses of the aquatic environment, and deteriorated water quality and biological communities are now common place in most river systems that traverse urban centers (or intense agricultural landuse areas). This also suggests a fundamental change in our perspective and design for stormwater management in developments could benefit regional ecological, hydrological, and human systems.

Our Public Trust Lands

Large investments have been made in many urban centers for the acquisition of public parks, open space. In many locations, the focus has been on purchasing (or protecting through creative means such as conservation easements,

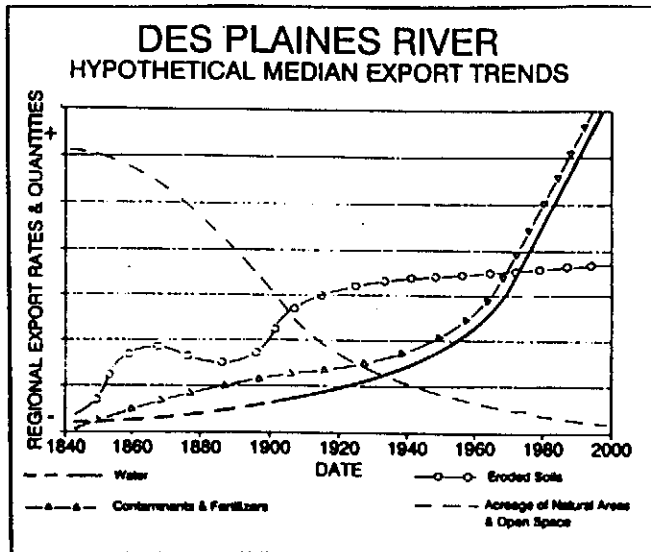


Figure 1. Hypothetical median export trends for the Des Plaines River, northeastern Illinois. The runoff curve was developed from median values from annual duration flow curves from the Riverside, Illinois gage data and data from the national archives (see Apfelbaum 1995).

land-swaps, land trusts, etc.) parcels found valuable from an ecological, natural resource, and biological perspective that also may be used for public recreation. In urban metropolitan Chicago, counties have established an extensive forest preserve district system which include approximately 15,000-70,000 acres of land in each county. This land has been purchased with a fundamental assumption that it would be protected and managed in perpetuity.

A recent study of 9,000 acres of the highest quality natural areas in a Chicago area county has concluded that a very large percentage of these valuable natural areas are deteriorating (Applied Ecological Services, Inc. 1996). The majority of the natural areas, especially the smaller sites (less than 250 acres), are very vulnerable and are severely degrading because of impacts from adjacent landuses. Edge effects including biological threats (such as exotic plants and animals) from the developed landscapes produce threats to the natural areas. This investigation has documented that few natural areas are isolated from development impacts. It is likely that only the largest areas that include buffers are likely to be sustainable. This study also has clearly documented that smaller natural areas surrounded by development will have significantly higher management and maintenance costs because of cumulative impacts from development. The estimated costs for this county to manage its natural areas over the next ten years exceed \$30 million (assuming no new ecological problems develop and that all management strategies are effectively and efficiently administered—and are successful). A large percentage of this cost is directly related to the cumulative

impacts from landuses and development in adjacent parcels next to the natural areas.

This exercise found that primary impacts of adjacent land-uses were as follows:

- hydrological changes contributing to changes in vegetation types, tree mortality, and other problems including severe erosion and deposition;
- soil, water, nutrient and chemistry changes including the introduction of many contaminants directly associated with changes in plant and animal species and their populations, community structure, and biological diversity;
- inadvertent introduction of exotic plant and animal species from residential and commercial areas; and
- incompatible intrusions including debris disposal, use as default open space by residents, directed sump pump waters, (etc.) into the preserves.

Cumulative impacts from each land development, or each residential lot, may be viewed to be minor by some, but their combined piecemeal effects are large and costly—and they will become increasingly costly over time. The incompatibility of conventional development with the public trust needs to be emphasized. Regionally, these lands are significant repositories for natural resources, and they provide key educational and scientific opportunities. Their value increases at an ever-increasing rate, not only from a conventional land value perspective, but also more importantly, as ecological resources and for human use and appreciation.

The Need for Retrospection

The examples of cumulative impacts to important and valuable ecological and human systems (which are intricately inseparable) suggest that we need to question our basic assumptions, regulations, ordinances, and guiding principals that have been fundamental to the landuse design and development process. For example, to understand less costly ways to address stormwater management, do we need to question their performance and treat these like any performance-based process?

Are stormwater management standards appropriate? Regional stormwater management plans, ordinances, and regulations started with basic assumptions on water yields associated with different landuses. Release rates have largely been derived from modeling runs of hypothetical storm events and flood probabilities. The standards that have been used to develop release rates have used the prevailing conditions as the modeled starting conditions.

Because most sites have been grossly modified, hydrology may no longer be representative of the historic relationships between water and landscapes. We assert that even under the current regulations, regional export of water and other resources (including contaminants) as displayed in Figure 1 are likely to continue unless there is a fundamental change in thinking (and only if the reference

for what is a pre-development condition for hydrology is redefined).

The Wrong Standard

Preliminary evaluations of regional hydrology suggest that pre-settlement ecological systems at a landscape scale had significantly reduced stormwater runoff. With settlement, rapid changes in regional surface hydrology occurred. We typically use this changed condition today as the reference against which proposed development impacts are judged, reviewed, and approved under regulations and ordinances.

If we are to enhance overall quality of the aquatic resource and sustain quality resources of valuable ecological resources (especially aquatic systems), we must realize that the post-settlement disturbed landscape should not serve as the standard against which proposed changes should be judged. A fundamental re-thinking of regulations about stormwater management may be necessary. We do not suggest here that the pre-settlement conditions are achievable. However, the base standards against which all projects would strive to achieve could be changed. Percent achievement by developments against more appropriate standards could be used as a basis of measurement of performance. Taxation and land use ordinances could have sliding scales of costs and user fees, (or taxes) depending on the measurement of the development's benefits. A performance credit system could be developed that would allow for transfer of opportunities for conscientious and environmentally responsible developers to developers that are less so inclined (for a fee). A regional stormwater plan could identify watersheds with various levels of priority for stormwater management.

Cumulative Benefits of Conservation Developments

As has been previously documented (Apfelbaum et al. 1995), several benefits have been both predicted and realized from developments that have come to be called "conservation developments." Conservation developments can target various levels of involvement with ecological resources and provide environmental benefits to address the six regional declining trends associated with conventional regional developments. In particular, conservation developments can offer the following:

- 1) significantly greater localized and regional stormwater management benefits for all storm events (compared to conventional developments);
- 2) localized and regional water quality benefits through improved source management of contaminants and erosion and deposition;
- 3) integration of open space for the benefit of the local environment and human use opportunities in the development;

- 4) integration of open space and natural resources in a development designed to facilitate health in adjacent open space that might be private or public trust lands;
- 5) revitalization of important human relationships with land and other natural resources through direct involvement by people in restoration, stewardship, and educational programming in a conservation development;
- 6) redefinition of what might be more appropriate land development standards through example and measurement of their benefits with scientific investigations;
- 7) redefinition and redirection of public perceptions and beliefs about appropriateness of land development standards through positive and win-win conservation development projects that target a quality human and natural environment as a fundamental development goal;
- 8) redefinition of the lending institution risk assessment process, as it pertains to protection and integration with natural resources during the development process; and
- 9) redefinition of the value (both short- and long-term) to society of natural resources—in real dollars.

Several conservation developments have been designed and developed in the United States. The Prairie Crossing project is highlighted as an example of how some of these nine potential benefits have been addressed.

Prairie Crossing—a Conservation Community

Prairie Crossing is a new conservation community occupying 667 acres in central Lake County, 40 miles north of Chicago, Illinois. The site was farmed under an annual crop rotation and has deep silt and clay loam soils from glacial till parent materials. The native landscape was significantly modified over the years by an extensive field tile system, agricultural tillage for perhaps 150 years, and pesticide use since the 1950s. This resulted in the elimination of native biological communities.

Started in 1994, Prairie Crossing will include 317 homes on 132 acres (20% of the site) with a high density "village center" and an outer area of cluster homes surrounded by open lands (Figure 2). The remainder of the residential site will be retained as open space and agricultural lands integrated with the residential development. The open space in and around the residential area is being restored to emulate historic functions and the aesthetics of pre-settlement prairies, wetlands, wet prairies, and savanna communities that occupied the site prior to and during the initial settlement by Indo-European immigrants in the 1830s. This restored landscape will provide a unique living environment for the residents of Prairie Crossing. The open space includes a newly constructed 22-acre lake, 13 acres of wetlands and 160

acres of created prairies. An additional 150 acres of agricultural are integrated to protect the rural agricultural landscapes that, until recently, typified this area of Lake County, Illinois.

Over 10 miles of trails through the restored prairies and wetlands and around the farm provide an opportunity to engage residents and guests and encourage them to learn more about the benefits of natural areas. From reduced costs for common area maintenance (for the Prairie Crossing Home Owners Association) to wildlife observation opportunities, residents experiencing these benefits are becoming natural area advocates. Many are subsequently joining the Liberty Prairie Conservancy, a volunteer group dedicated to preserving and restoring the open space areas of the Liberty Prairie Reserve (a 2,500-acre open space area purposely connected to Prairie Crossing).

The open space at Prairie Crossing (Figure 2) is designed to provide stormwater management functions for the project (Figure 3). The stormwater system was designed as a treatment train with several components that each contribute in sequence to treat the water before it enters the central lake and leaves the site. Stormwater runoff from residential areas outside the village center is routed into swales. These swales convey runoff from roadways and residential lots into expansive prairies, while providing a mild amount of infiltration and settling of solids. The prairies are the second component of the treatment train. The prairies slowly convey stormwater as diffuse overland flow to the wetland systems bordering the lake. The prairies are expected to infiltrate and evapotranspire a substantial portion of the annual surface runoff volume due to their very deep root systems and productivity, and provide for additional solids settling. The wetlands are the third component of the treatment system and provide both

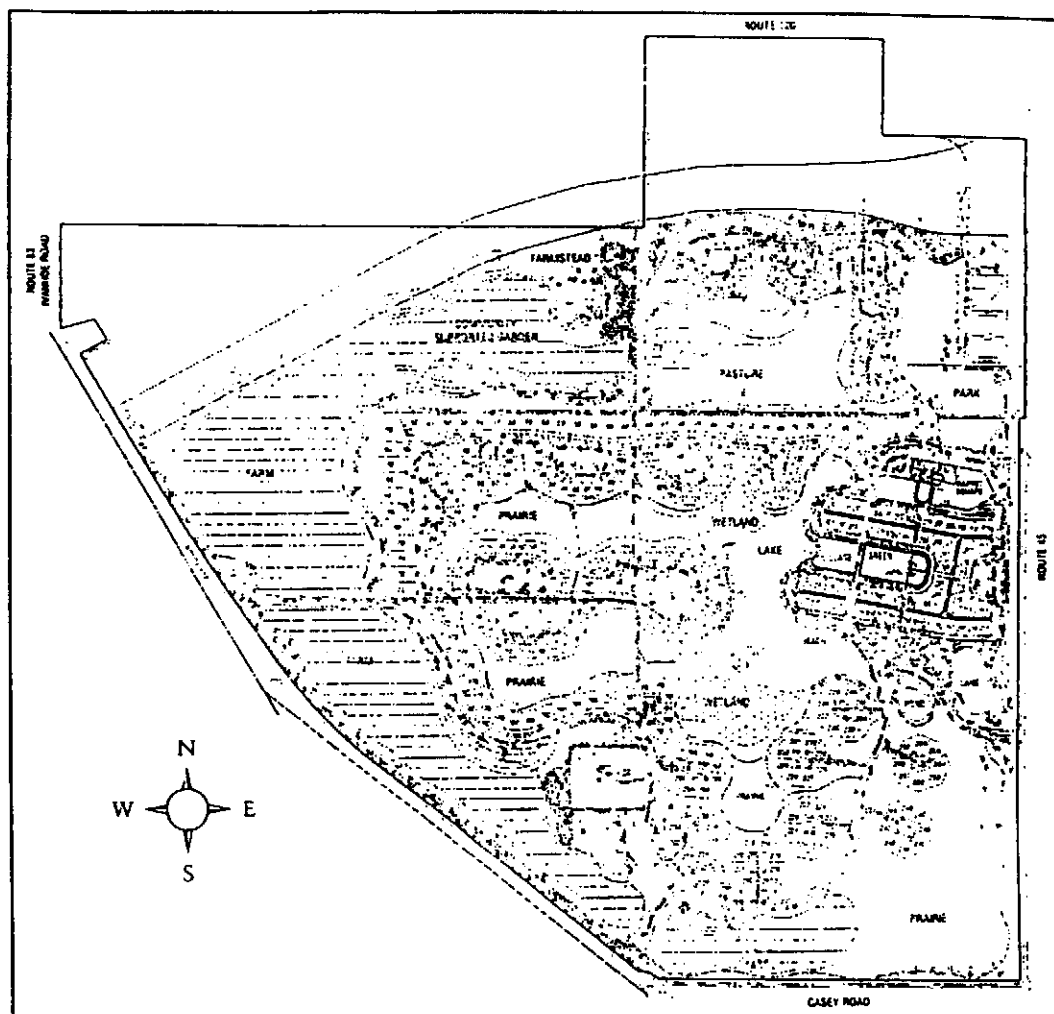


Figure 2. Layout of the Prairie Crossing residential development (Grayslake, Illinois). The stormwater treatment train is installed as an integral component throughout the project.

stormwater detention and biological treatment prior to the runoff entering the lake. The final treatment component is the lake. The lake also will provide stormwater detention. The components of this stormwater treatment train management system are designed to increase the water quality of stormwater runoff and reduce the stormwater runoff peaks and volumes.

The system as installed allowed the developer to save over one-half million dollars when compared to installing a traditional storm sewer system with curb and gutter. Additional savings were available by reducing the area of impermeable surface.

Although not enough time has passed to fully evaluate the performance of the swales, mature prairies and wetlands for stormwater treatment and management, our modeling results predict a 65 percent reduction in runoff when compared to a conventional development with similar density (Apfelbaum et al, 1995). Projected water quality improvements show similar gains.

This improvement in water quality and stormwater management makes a direct contribution to regional

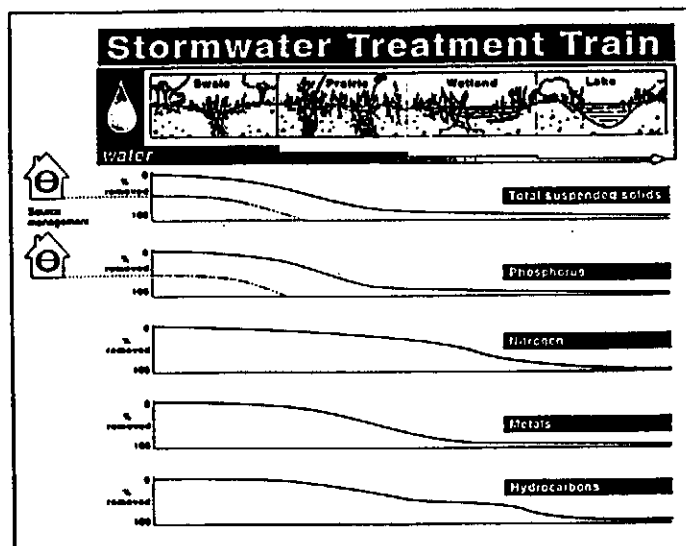


Figure 3. The stormwater treatment train at Prairie Crossing (Grayslake, Illinois) was designed to reduce runoff and increase quality of water in and that leaving the residential development.

stormwater management and natural resource conservation. Immediately downstream of Prairie Crossing is the 2,500-acre Liberty Prairie Reserve containing six Illinois State Nature Preserves. The water leaving Prairie Crossing flows through the nature preserves ultimately entering the Des Plaines River at the eastern edge of the Liberty Prairie Reserve. The improvements at Prairie Crossing allow these important natural areas to perform at significantly higher levels and contribute to an enhanced Des Plaines River (as compared to the predevelopment agricultural land-use scenario and a conventional development approach).

Because of our focus on water quality, some of the nine potential benefits of conservation developments have not been addressed in this paper. However, it is clear that projects such as Prairie Crossing are achieving many of the other benefits. Some, such as addressing lending institution risk, will be addressable only after several years of additional history, project sales performance, and project costs become available.

Hybernia and Sedgewood Cove

Hybernia and Sedgewood Cove (Highland Park and Lindenhurst, Illinois) are conservation developments that have addressed the integration of natural resource areas with residential developments in order to obtain conservation benefits. These developments exemplify the meshing of residential living with natural areas, while fulfilling the financial goals of the developer and the demand for new housing in Lake County, Illinois.

Both the land and the residents of Hybernia and Sedgewood Cove benefit from the conservation development approach. The land-use plans (Figures 4 and 5) incorporate the following features at Hybernia: ponds up to three acres size, a registered Illinois Nature Preserve, and numerous walking trails throughout the property. Hybernia's preserve has protected over 300 plant species including the federally endangered White Fringed Orchid. Additionally, Sedgewood Cove contains lake frontage on Crooked Lake, a nature reserve, and numerous walking trails. Thus, the preserves in both



Figure 4. The Hybernia project includes a 27 acres state of Illinois dedicated nature preserve, a created waterway system that separates and buffers the developed lands from the preserve, and additional acreage of dedicated open space—some with high quality natural area. Hybernia project is 132 acres with 119 clustered homes. Approximately 50 percent of the acreage has been retained as open space.

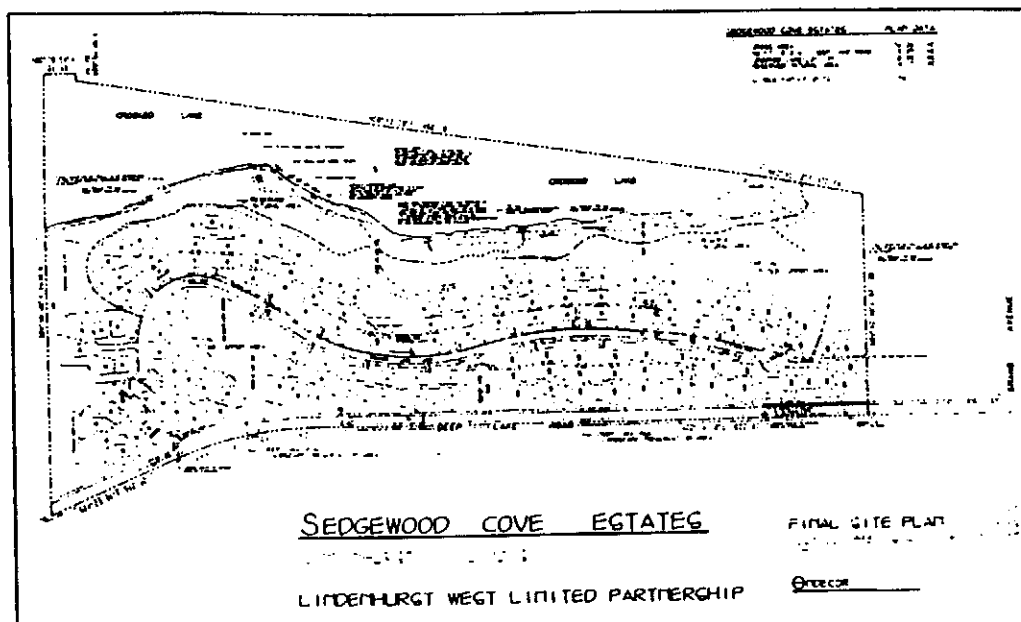


Figure 5. Sedgewood Cove protected a lake shore, created hydrologic buffers to protect the adjacent lake, and established a private nature reserve as an integral element of the project.

properties provide the opportunity for the residents to interact with nature within the developments.

For stormwater management, both projects have been designed to work within the framework of the land's existing hydrology. The waterway system at Hybernia retains water within the development and also buffers the hydrology of the developed areas from the nature preserve. At Sedgewood Cove, some stormwater is pretreated in managed wetlands before entry into the lake.

The residents are active in the monitoring, restoration, and preservation of the nature preserves. Homeowner's associations utilize the services of a stewards to perform the monitoring and restoration of the preserve areas. Associations also are proactive in teaching residents about the preserve. For instance, at Hybernia, the residents have a nature preserve committee that schedules a variety of activities including nature walks with the preserve steward, seed collecting and non-indigenous plant life removal. Strict covenants that protect the open spaces, along with endowments, provide the financial assurance that restoration, management, monitoring, and education will continue in to the future. Thus, the projects help revitalize the relationship between nature and humans.

Conservation developments produce win-win results for both the developer and the residents of the developments. At Hybernia and Sedgewood Cove, the developer marketed the natural features as amenities which resulted in higher sales prices. A developer can also lower the institutional lenders risk because the concern over environmental liability is typically reduced in conservation development. In addition, the real value gained in these developments is in the dollar value of maintaining natural resources that would normally have been lost in a non-conservation

development. Moreover, conservation developments help redefine the standards for appropriate landuse on vacant land rich with natural resources.

Conclusion

Conservation developments offer an alternative approach in rapidly urbanizing areas to address land development and resource management/protection during design, construction, and thereafter. One can only speculate on the cumulative benefits from conservation developments if these types of projects became more prevalent.

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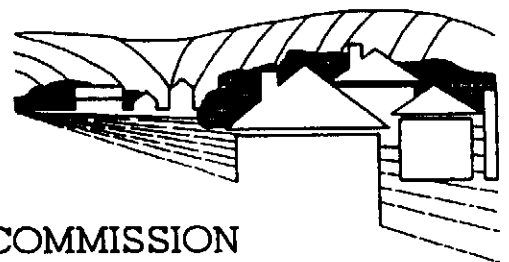
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OPEN SPACE AS A RESOURCE

IN THE LAND PRESERVATION DISTRICT

OCTOBER 1995

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MONTGOMERY COUNTY PLANNING COMMISSION

THE LPD AND OPEN SPACE

The purpose of the Land Preservation District (LPD) is to preserve open land, sensitive natural areas, and rural community character. The LPD permits residential development in the form of small compact neighborhoods surrounded by large amounts of open space. Neighborhoods are located to protect natural features such as farmland, woodlands, stream valleys, or scenic views. The LPD provides maximum design flexibility for preserving meaningful open space on a tract of land.

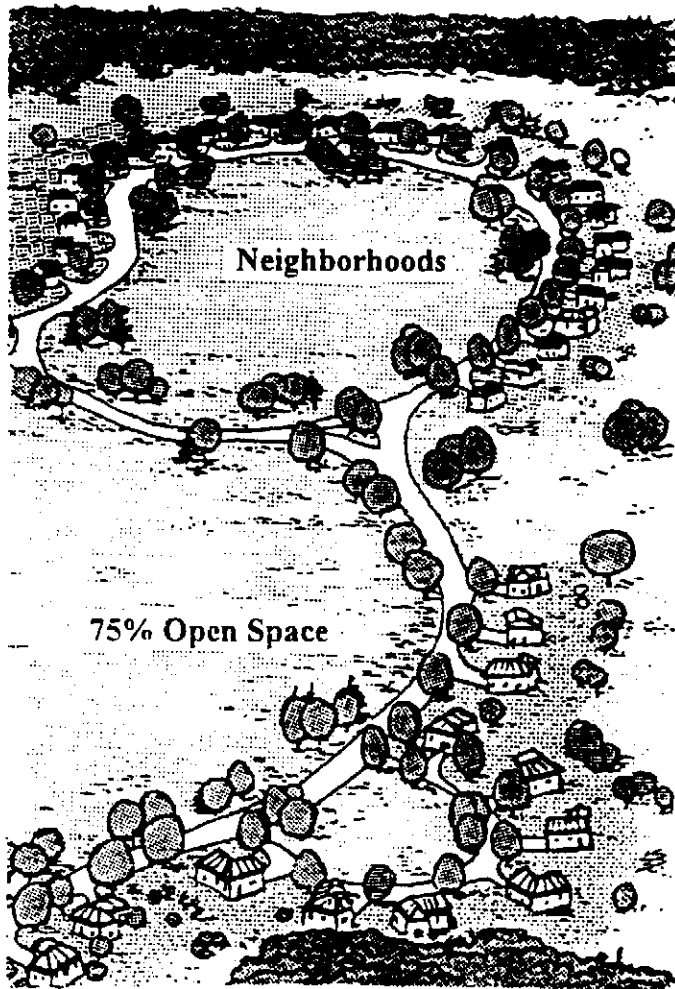
Since the LPD requires 75 percent of a tract to be preserved in open space, a logical question is, What should be done with this preserved land? Should it be kept natural or used for active recreation? What uses are suitable for residents of the proposed community and the municipality in general? and What uses can the land support? Should a meadow be preserved or allowed to grow up into a woodland? These questions can be answered by a landscape management plan for the open space. This plan identifies how the open space will be used and how it will be managed to meet LPD goals and municipal goals. The LPD open space can be tailored to fit the municipal open space plan.

Comprehensive open space planning is a critical component of successfully implementing a Land Preservation District. Open space planning targets the open space areas and natural features that a municipality wants to preserve and enhance. Using the open space plan as a framework, a municipality can successfully implement the LPD because it has identified and prioritized where open space should be saved and how it should be used.

This report discusses:

- Options available for the physical use and management of the open space created by LPD development.
- Various types of landscapes that can be preserved or created in LPD open space.
- The function of a landscape management plan.
- How the long-term management of the open space can tie into the community wide vision for open space.
- The role of open space planning in municipal comprehensive planning.

This report does not address the various options for open space ownership or the issues involved with the legal protection of preserved open space.



LPD Key Design Features

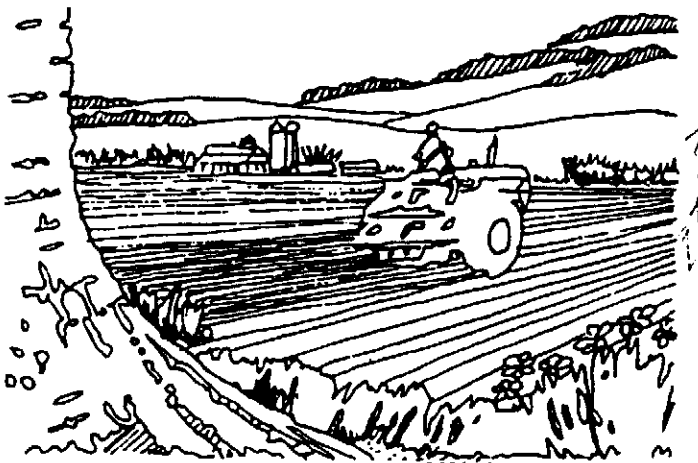
- 75% open space
- design criteria for neighborhoods
- emphasis on community open space goals



OPEN SPACE PLANNING

What is "Open Space"?

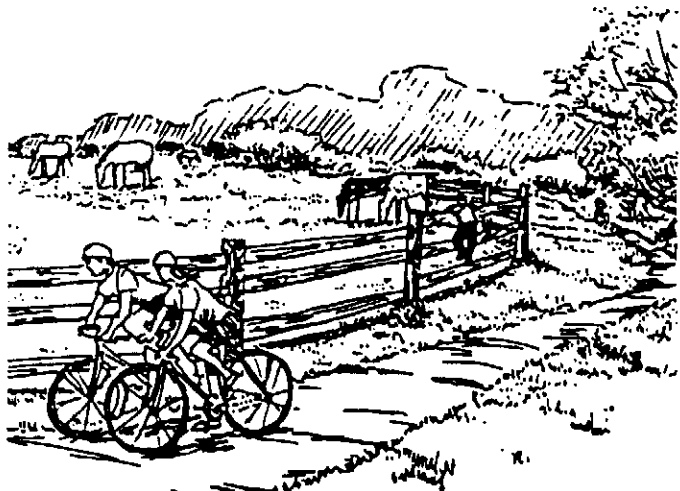
Open space is not idle, purposeless, or useless land. And, it is not the same as "vacant" or "unused" land. It is land that is consciously protected from development. Open space, including public parks, trails, greenways (linear open spaces connecting recreational, cultural, and natural areas), farmland, privately protected conservation easements, and natural areas, is valued for its environmental protection, recreational opportunities, and aesthetic appearance. The greatest benefit of open space is quality of life or the enjoyment residents gain from their surrounding community.



Source: Commonwealth of Pennsylvania Department of Agriculture

Further, preserved open space has been shown to enhance property values in a community. Studies in several communities have shown that increased property values correlate with the proximity and accessibility of open space. Homes in cluster developments with open space have been shown to appreciate more rapidly than homes in communities with traditional lotting patterns. Open space and its positive impacts can attract business and industry and enhance the value of a community by enriching an area's image.

The "character" of a community is often determined by how developed or undeveloped the community is perceived to be. This perception is the result of how much development is seen, versus how much development really exists. LPD cluster development can create the perception of a community having a great deal of open space by locating homes so that they are not easily seen.



Each community must determine its own desired character. The development or preservation of this character should be guided by the community's comprehensive plan. The policies, goals, and principles of the comprehensive plan direct the preservation of open space and the location of development. Ideally, areas to be preserved should be identified first, with development allowed outside these areas, not the other way around.

Preservation and Protection of Open Space

The Pennsylvania Municipalities Planning Code, Act 247 as amended (MPC), is the state legislation that governs how a community may approach land use planning. The MPC recommends that a municipality's development and land use goals be documented in a comprehensive plan. An important part of the comprehensive plan is the future land use map, which depicts where specific types of development and land uses should be located. In Section 301, the MPC suggests that open space be identified as a particular type of land use to be shown on the future land use map. An open space plan can be prepared as part of a comprehensive plan or adopted as a freestanding document.

In Montgomery County, many municipalities are drafting open space plans that will conform to the requirements of the Montgomery County Open Space Preservation Program recommendations, which were adopted by the county commissioners in 1993.

Elements of an Open Space Plan

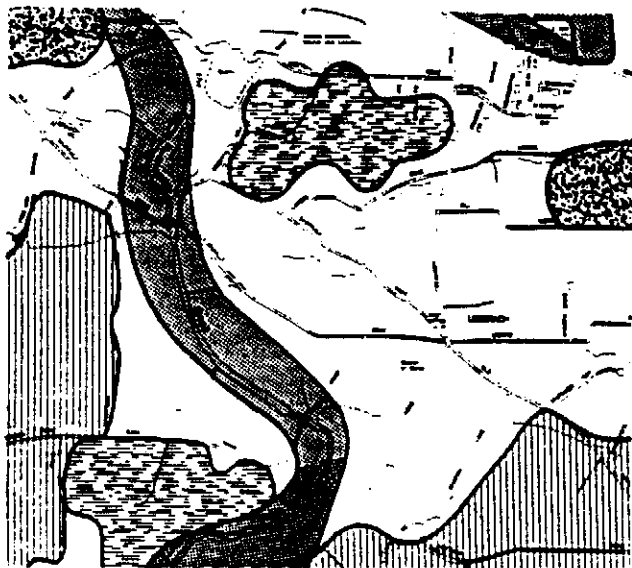
An open space plan examines a community's natural, historical, and recreational resources and describes how best to retain the resources that are necessary to protect and promote the health, safety, and general welfare of its residents. The promotion of a certain community character based on open space preservation is an integral element of the plan. Municipal goals and objectives are compared to existing conditions, and recommendations are formulated for meeting future needs and creating the community image. Lands that are best suited to remain undeveloped are identified and mapped.

These are commonly grouped into three general categories:

- **Recreational Open Space**
(lands for public use including parks, trails and greenways, and active nature preserves).
- **Conservation Open Space**
(environmentally sensitive land that should be protected to avoid potential environmental problems and hazards to life and property).
- **Scenic Open Space**
(lands that are unique parts of the landscape and should be preserved because of their visual impact on community character).

The map of proposed open space should be reflected in the municipal future land use map and should be used to guide all future land preservation efforts.

Open Space Plan



- Recreational Open Space
- Conservation Open Space
- Scenic Open Space
- Farmland

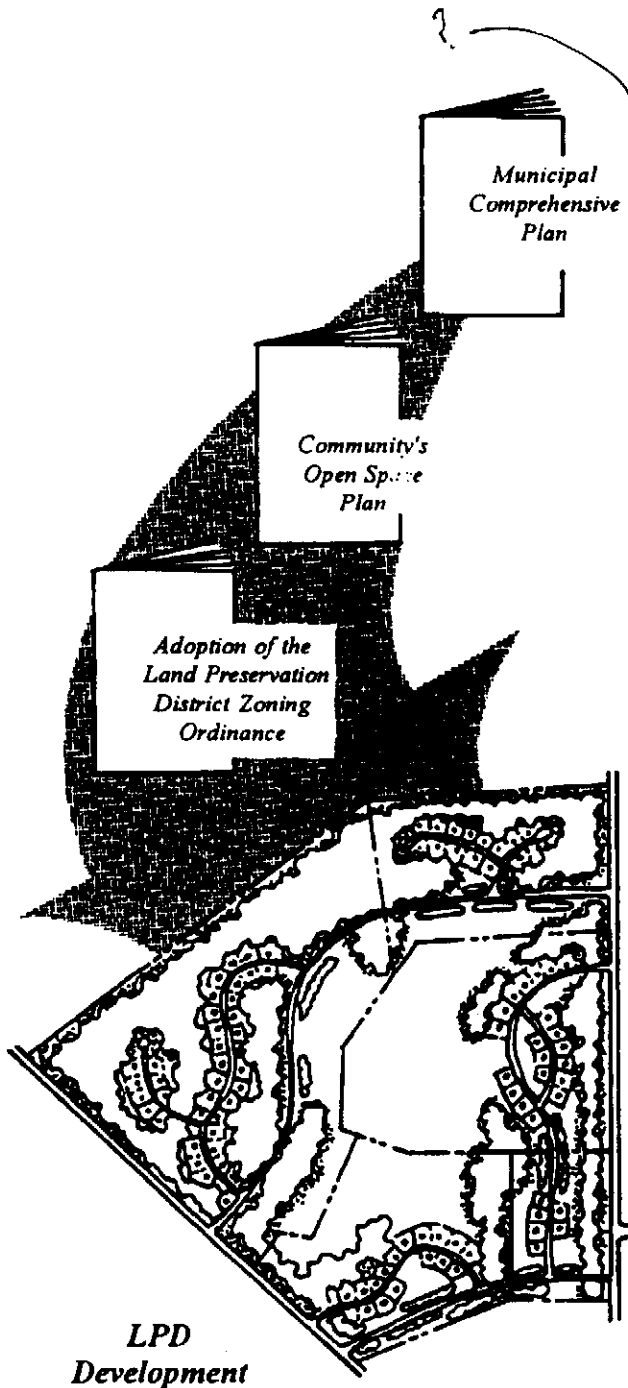
How Does LPD Development Fit into Municipal Open Space Planning?

LPD development is just one tool for implementing the preservation of open space. The LPD is not suitable for all areas of a municipality and, therefore, cannot be relied upon to preserve the many different types of open space needed.

LPD development alone can have a significant impact on a municipality's efforts to preserve open space, if it is applied to a large enough area. However, the impact of a municipality's open space preservation efforts will be greatest if several programs are combined. Coupled with the many other implementation tools available to a municipality, such as farmland preservation, agricultural zoning, urban growth boundaries, transfer or purchase of development rights, conservation easements, etc., the LPD can play a key role in the preservation of open space.

When an LPD development is submitted for approval, the municipality can guide the developer on how it would like the plan to fit into the municipal open space plan. For example, if the tract borders a creek identified as part of a townshipwide trail system, this can be incorporated into the development plan. Or, if the township has targeted the area in which the tract lies as desirable to develop a township park, part or all of the LPD open space could be dedicated to the township for this purpose, and the residential part of the development could be designed accordingly.

The township zoning ordinance should include in its Land Preservation District, requirements for implementing the municipal open space plan on tracts that fall within the framework of the plan. And, the township subdivision and land development ordinance should include in its processing requirements for LPD plans, documentation of how the LPD plan fits into the municipal plan.



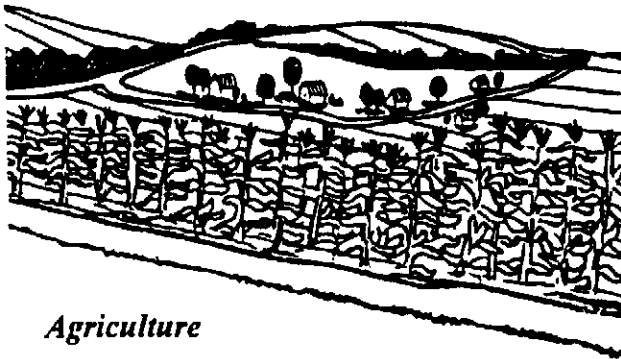


Source: T.D. Rader Cooperative Extension Service,
the Pennsylvania State University

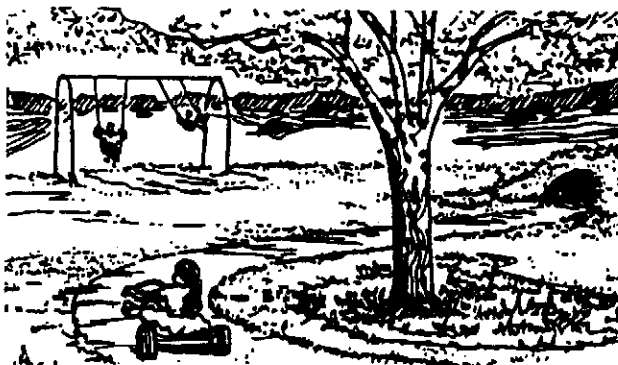
Natural



Naturalized



Agriculture



Manicured

OPEN SPACE MANAGEMENT

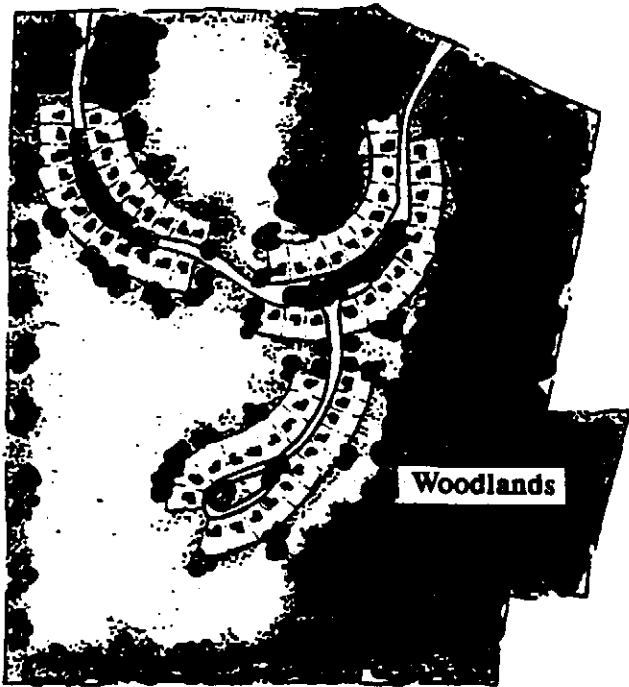
LANDSCAPE TYPES

The LPD preserves 75 percent of a tract in open space. Some of this open space is required to be located within the neighborhood groupings that are created (up to 1/2 acre of open space per neighborhood of 25 units). However, the bulk of the open space is located outside the neighborhoods. In defining the appearance and use of the open space, it is helpful to think of the variety of landscapes already familiar to us. These can be grouped into three major categories: natural landscapes, naturalized landscapes, and agricultural landscapes. Each of these landscapes can be preserved, if existing or created over time.

Another landscape, not recommended for extensive use in LPD open space, is a manicured landscape. This landscape gives open space a conventional suburban appearance. A manicured landscape consists of expansive areas of mowed lawn with supplemental planting of trees, shrubs, and flowers. The goal for LPD open space is to preserve or recreate elements of a community's natural rural character that already exist in the area. This includes preserving or creating natural features such as meadows, woodlands, and hedgerows within the open space. Manicured landscapes are artificial environments that do not occur naturally, and their use in LPD open space should be limited. However, there are places within LPD developments where these landscapes are appropriate, such as around residential dwellings, at development entrances, in neighborhood open space, and along pedestrian paths. Active recreational uses are also permitted in LPD open space. However, extensive grading for playing fields or the construction of tennis courts or swimming pools is not recommended, unless such facilities are desired by the municipality as part of a community park.

Manicured landscapes are costly to install. They also require continual maintenance such as mowing, pruning, replacing vegetation, and performing continual cleanup. Since this landscape type requires a high degree of maintenance, it should be used only where the benefits to residents outweigh the potential costs. Manicured landscapes offer the fewest environmental and ecological benefits to LPD developments, require the most financial commitment, and are not compatible with the goal of rural preservation.

The following section describes each of the three landscape types recommended for LPD open space and how to preserve or create these landscapes. It also describes the advantages or disadvantages of each type to LPD residents.



Locating homes in open fields saves the existing woodlands.

NATURAL LANDSCAPES

Natural landscapes are existing plant communities such as woodlands, hedgerows, wetlands, stream corridors, floodplains, meadows, and thickets. These landscapes are suitable for buffer areas or environmentally constrained areas in LPD developments. Natural landscapes provide scenic and ecological benefits to communities by preserving views, providing visual relief to the landscape, mitigating adverse weather effects, providing animal habitat, conserving soil and water, cleaning the air, and providing passive recreational and educational opportunities.

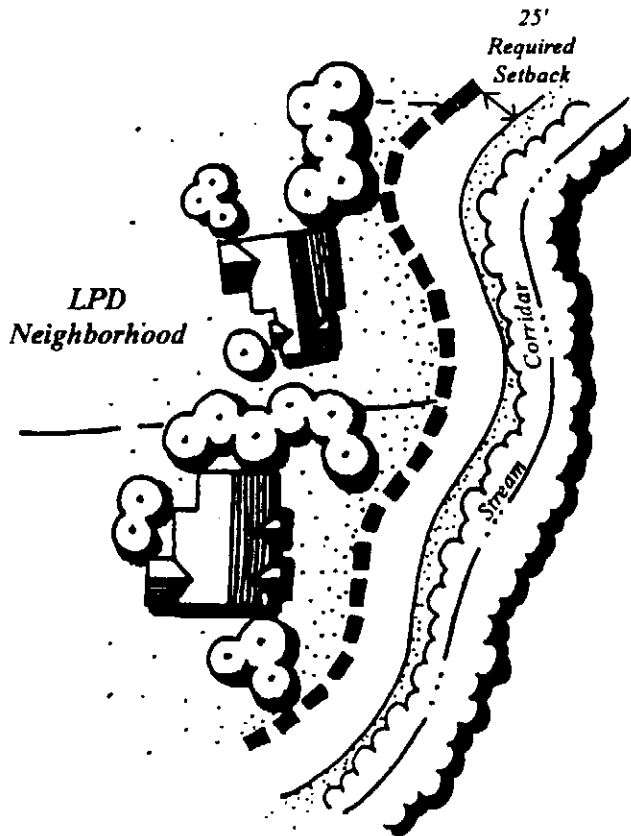
Protecting Existing Natural Landscapes

Preserving existing natural landscapes for aesthetic as well as ecological purposes is a priority in LPD development. A man-made landscape cannot equal the visual impact or intrinsic value associated with existing natural landscapes, such as a mature woodland. The LPD provides the design flexibility to locate the allowed dwellings in a way that best preserves the natural landscapes. Since one purpose of the LPD is to preserve open space, sensitive natural areas, and rural community character, a straightforward and simple way to achieve this LPD goal to protect and maintain the existing natural landscapes on LPD sites. As a part of protecting and maintaining natural landscapes in LPD open space, care must be taken not to damage plant communities during construction activities. Establishing setbacks from natural landscapes is a successful method for protecting plant communities. A setback creates a permanent buffer zone, a fixed distance from the area to be preserved, and prohibits placement of structures or land disturbances within this area.

The LPD establishes a minimum setback of 25 feet from the edge of neighborhood lots to wetlands, floodplain, and watercourses. A municipality may establish additional setbacks from other natural landscapes such as woodland edges or meadows.

The widths of setbacks may vary, depending on their purpose. Setbacks from stream corridors help to maintain water quality. Riparian vegetation (vegetation located along streams or waterways) found within setback areas aids in stabilizing stream banks, filtering pollutants, and preventing sediments from entering the stream.

Setbacks should not be included within individual residential lot areas, since, over time, homeowners may degrade these areas by extending their lawns and gardens, placing



When locating LPD neighborhoods a 25-foot setback is required from all natural features such as stream corridors, floodplain, and wetlands.

structures, or filling and dumping. Coupled with setbacks, actual physical protection in the field, such as fencing, is needed to ensure the protection of natural landscapes during construction.

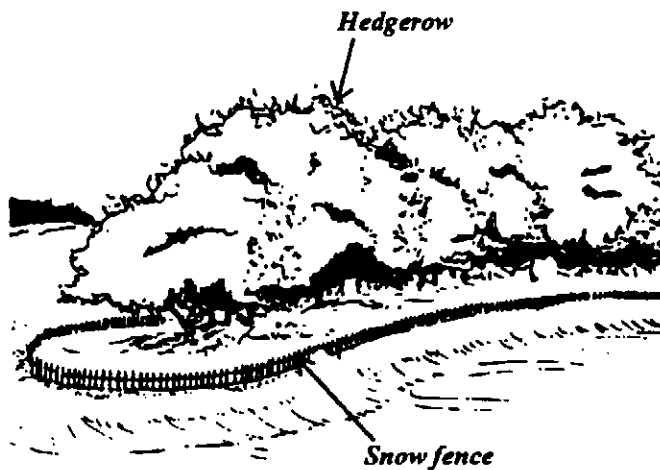
Natural landscapes to be saved should be identified in the field prior to any disturbance and should be physically protected throughout the construction process. The vegetation to be saved, and the method for its protection, should be identified on the landscape management plan.

One common protection method involves erecting a temporary physical barrier, such as a snow fence, along the edge of a woodland or other natural landscape prior to any construction or clearing on site. The fence is placed to prevent disturbance or compaction of soil around tree roots and should remain until all construction is completed. This barrier clearly delineates areas of undisturbed vegetation, helps to prevent mistaken clearing by contractors, prevents storage of construction materials or parking of equipment, and provides easy verification of undisturbed areas by construction managers or code enforcement officers.

It is also important to note that removing trees along an established woodland edge may further damage interior woodland trees. Exterior trees have been exposed and are resistant to the damaging effects of sun and wind. Interior trees are not. If exterior trees are removed and no protection is provided for the remaining interior trees, many of these trees may be damaged.

Maintenance

Natural landscapes incorporated into LPD open space require little capital investment by the developer, which reduces the initial cost of open space development. Periodic maintenance by the homeowners, such as annual mowing, removal of invasive plants and deadwood, incidental planting, and pests and disease control, may be needed to sustain the health of these plant communities. The costs of this type of maintenance will remain low compared to those required in traditional man-made suburban development.



Natural landscapes to be saved should be identified in the field prior to any land disturbing activity and should be physically protected throughout the construction process.

Boo
Preservation
Statement



Stream corridors are natural landscapes consisting of a stream channel and its adjacent lands.



Source: Daniel Devlin, Jack Payne, Rae D. Chambers. PA Woodlands Cooperative Extension Service, The Pennsylvania State University.

Creating buffer zones along stream banks preserves existing vegetation and protects water quality.

STREAM CORRIDORS

Stream corridors are natural landscapes often found on LPD tracts. A stream corridor consists of a stream channel and its adjacent lands. Floodplain, wetlands, alluvial soils, woodlands, lowland meadows, and steep slopes are natural landscapes typically found in stream corridors.

Protecting Streams

Protecting streams in LPD open space is important for the environmental, ecological, and recreational needs of the community. Stream corridors provide valuable plant and wildlife habitat and passive recreational opportunities for trails and fishing. They also act as silt and chemical buffers for streams and function as open space corridors or greenways in many municipal open space plans.

Stream corridor protection emphasizes water quality protection and enhancement by controlling the sediments and contaminated runoff that enter the stream. Pesticides and fertilizers from adjoining lawns or farm fields, failed septic systems, and sedimentation from soil erosion on adjacent construction or agricultural sites degrade a stream's water quality. Preserving existing vegetation, wetlands, floodplain, meadows, steep-sloped areas, and other natural landscapes along streams is essential in protecting stream resources. Stream bank vegetation helps filter pollutants from runoff before they enter the water. The roots of riparian vegetation stabilize stream banks and reduce soil erosion by holding the soil in place and slowing the velocity of runoff.

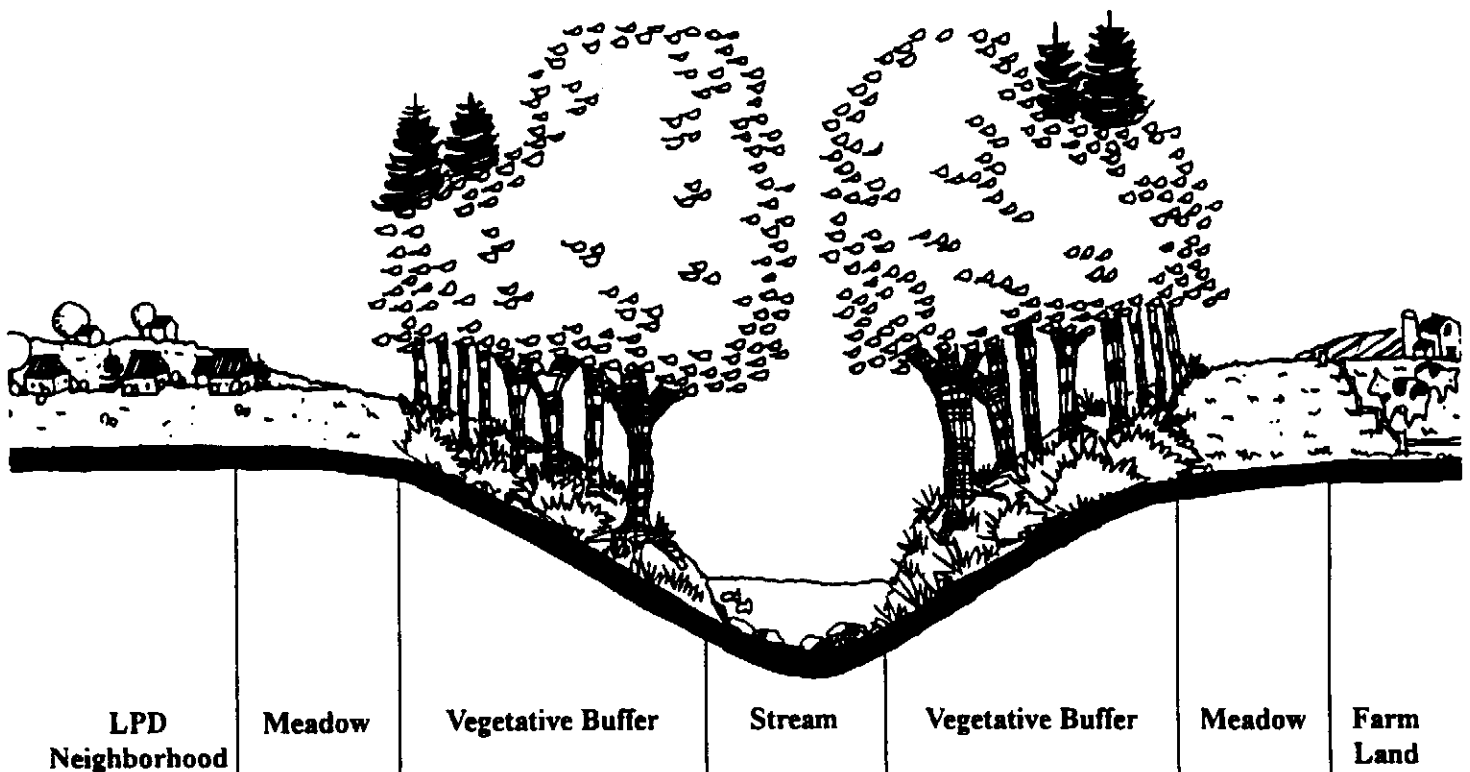
Creating buffer zones along stream banks by establishing setbacks a fixed distance from the bank helps regulate the placement of structures and conflicting uses and limits land disturbing activities that may harm the stream.

The LPD ordinance suggests minimum buffer setbacks of 25 feet along both sides of a stream. The width of these buffers may be increased due to varying on-site conditions.

Factors include soil type, steepness of the stream bank, the size of the area that directly contributes runoff and sediments to the stream and the intensity of disturbances of the adjacent upland properties. Buffer widths may need to vary along the length of the stream to effectively filter sediments and nutrients, maintain stream flows, and protect significant natural features. Buffering streams from adjacent lawns, pastures, and farm fields by preserving or creating natural landscapes such as woodlands or meadows helps ensure the

stream's protection. To help control sediment and nutrient removal from runoff, buffer widths of between 60-150 feet are commonly recommended. To establish wildlife corridors and habitat, buffers of 100-300 feet are suggested.

In addition to setbacks, other techniques, such as planting disturbed areas next to streams with native vegetation, preserving steep-sloped areas, limiting disturbances to stream channels, and controlling stormwater runoff, help protect streams and improve water quality. When replanting along streams, three distinct layers of vegetation are recommended. These include trees that form an overhead canopy, shrubs that provided an immediate layer, and herbaceous plants that serve as ground cover. Planting in this manner helps to recreate the natural stream habitat. In each LPD development, the width of the stream corridor buffers should be evaluated on a site-by-site basis to determine the degree of protection needed. All stream corridor protection methods within LPD open space should be shown on the landscape management plan.



Source: Welch, David J. *Modified Riparian Forest Buffers*.
US Department of Agriculture Forest Service

Stream Buffer Planting



Source: Daniel Devlin, Jack Payne, Rae D. Chambers. PA Woodlands Cooperative Extension Service, The Pennsylvania State University.

Wetlands are a valuable environmental resource.

WETLANDS

Wetlands comprise another common natural landscape suitable for LPD open space. Wetlands are defined by the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Resources (DER) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and other similar areas.

When identifying wetland areas, three basic conditions usually exist. These include the hydrophytic plants (plants adapted to life in saturated soil conditions), hydric soils (soils characterized by the presence of water), and wetland hydrology (the presence of water at or near the surface during the growing season).

Benefits of Wetlands

In the past, wetlands were viewed as having little value. Draining and filling them was common. Today wetlands are recognized as a valuable resource worth preserving for their environmental and ecological benefits. Wetlands benefit communities by improving water quality. They remove the sediments and chemicals from the water that passes through them. This water-cleansing function is important in agricultural and suburban areas where runoff may be contaminated.

Controlling floodwater is another benefit of wetlands. Wetlands store excess water during heavy rainfalls, snowmelts, and high discharge from streams. They slow floodwaters, absorb them, and temporarily store them, until they are released gradually to nearby streams. This helps in preventing property damage to nearby homes and farmland.

Other benefits include controlling erosion, supporting fish and wildlife habitat, and providing recreational and educational opportunities for canoeing, fishing, hiking, and bird watching.

Wetland Regulations

Wetlands are regulated by federal, state, and local regulations. In 1972 Congress enacted Section 404 of the Clean Air Act, which created the requirements of the federal wetland permitting program. Section 404 prohibits the discharge of dredged or fill material into the waters of the U.S. without a permit. Waters of the United States include all wetlands. Section 404 does not regulate all harmful activities to wetlands such as draining, flooding, or removing vegetation, but these activities are covered by Pennsylvania's

wetland regulations. Pennsylvania's Chapter 105 permit program, created by the Dam and Safety Encroachment Act and administered by The Department of Environmental Resources (DER), is the basis for the state's regulation of wetlands.

Most activities that disturb wetlands require a 105 permit. Local governments may supplement federal and state regulations with their own protection techniques. The Pennsylvania Municipalities Planning Code specifically identifies preserving wetlands as a legitimate zoning purpose. The MPC allows local governments to use their powers of protecting public health, safety, and welfare to further regulate wetlands through subdivision and zoning ordinances.

Wetlands and LPD Open Space

The LPD encourages the preservation of these natural landscapes as permanent open space. Establishing wetland buffers, similar to those recommended for stream corridors, helps to limit any land-disturbing activities that could harm these natural ecosystems. As with most natural landscapes, it is important to preserve them in their natural state, rather than to try to recreate them. The LPD recommends avoiding any construction activity within wetlands.

If wetlands are to be preserved as part of the required LPD open space, all steps to secure, maintain, or use the area should be addressed in the landscape management plan. The plan should include guidelines for maintaining the area in its natural state. This may require gathering basic information on the hydrology, vegetation, and animal and bird activity so the wetland can be monitored for damaging changes over time. Other management concerns include controlling and eliminating exotic and invasive plant species that overtake the wetland and monitoring the area for illegal dumping, which could become a problem in some areas.

NATURALIZED LANDSCAPES

When natural landscapes, such as woodlands, wetlands, hedgerows, meadows, or thickets, do not exist on site, it is often possible and desirable to create them. This process is called naturalizing or habitat enhancement. The naturalizing process requires an initial planting and maintenance period followed by reduced maintenance as natural processes take over. The addition of ponds or lakes in open space can aid in creating lowland or wetland environments. Areas suitable for naturalizing include disturbed sites such as old farm fields; environmentally sensitive areas such as steep slopes or floodplains; and unused lawn areas, where it is desirable to keep maintenance costs low.

Naturalized landscapes can be beneficial to LPD developments in several ways. They help reduce the overall maintenance costs associated with the required open space and improve the visual and biological diversity of the site. Naturalized landscapes, including woodlands and meadows, can serve as scenic amenities, create privacy for homes, provide habitat for plants and animals, and create passive open space for residents. Naturalized hedgerows, planted along roadways, help to minimize views of new development while preserving elements of a community's rural character.

Successional Cycle

To understand how naturalized landscapes are created in the LPD open space, it is necessary to understand the forest successional cycle. Succession refers to the vegetative changes that develop over time on a site, if left undisturbed. These vegetative changes progress through stages from annuals (plants living for only one season) to perennials (plants with a life cycle of more than two years) to shrubs and finally to mature trees.

Successional Stages



Age, Years	<1	1-3+	3-20+	20-60+	60-100+	100-150+
Stage	Bare Field	Forb-Grassland	Grass-Shrub	Shrub-Tree	Intolerant Trees	Tolerant Trees Climax

Source: T.D. Rader, Cooperative Extension Service, The Pennsylvania State University

A mowed lawn area left unattended transforms into a mature hardwood forest in about 150 years. However, we can speed up this successional cycle to create a desired naturalized landscape by planting appropriate native vegetation and maintaining this vegetation at a desired stage. For example, meadows or intermediate stages of shrubs and small trees can be created on a tract in five to ten years.

To ensure low maintenance within naturalized landscapes, native plants and seeds should be used for all plantings. Since these plants occur naturally, they are better suited to the existing soil and climate of the area, are more tolerant of disease and insect problems, and provide a valuable food source for wildlife.

The following text describes the use of naturalized landscapes such as meadows, woodlands, and hedgerows in LPD open space.

MEADOWS

Meadows are naturalized landscapes that can be created in the LPD open space by intentionally interrupting and suspending the forest successional cycle at the perennial stage. Meadows consist primarily of perennial grasses and wildflowers (forbs) and are maintained at this stage by mowing or burning to prevent the natural invasion of shrubs and trees. By choosing the right plant material, meadows can be established in dry, sunny, well-drained locations or in wet and moist areas such as floodplains. Creating both dry and wet meadows in open space areas provides a greater diversity of animal and plant habitat. Size is not a limiting factor in establishing naturalized meadows. Meadows can be created at any scale, from a small lawn area that is left unmowed to an area many acres in size. Meadows can be tailored to fit most surroundings but are most effective when bordered by shrubs and woodlands.

Creating a Meadow

Meadows can be created by seeding or planting an area with both wildflowers and warm-season grasses. It is important to include both plant types to achieve a naturalized landscape. A planting mixture of at least 50 percent grasses and 50 percent wildflowers is suggested. Grasses provide support and protection for tall flowers, create a dense mat that resists weed growth, stabilize the soil, and add color and texture to the meadow while supplying food and cover for wildlife. Many seed companies offer useful native seed mixtures for meadow planting, adapted to specific geographic regions of the country.



Source: Daniel Devlin, Jack Payne, Rae D. Chambers, PA Woodlands, Cooperative Extension Service, The Pennsylvania State University.

Meadows can be tailored to fit most surroundings but are best when bordered by shrubs and woodlands.



Source: National Wildflower Research Center

Naturalized meadows are created by planting an area in both wildflowers and warm-season grasses.

Plant Selection

Things to consider when selecting wildflowers for meadow plantings include plant height, flower blooming period, color, seed and plant availability, and the length of growing season. Fall is usually the best time to plant a meadow. The weather is cooler and wetter. Seeds that germinate in this season have sufficient time to establish a root system before winter. Seeding a meadow in the fall is the best approach to establishing both spring and early summer wildflowers.

Meadow Maintenance

A planted or seeded meadow takes at least three to five growing seasons to fully establish. Meadows can be created from existing lawn areas by stopping the repetitive mowing of grass and allowing natural succession to take over. A self-sustaining meadow is created within three to four years. Meadows need at least annual mowing to control exotic weeds and the natural invasion of shrubs and trees. When meadows are created in LPD open space, regular maintenance may include occasional mowing, weeding, and some irrigating during dry planting periods. The removal of weeds can be done by hand or by spot-spraying with an herbicide.

Mowing Schedules

Annual meadow mowing can take place at various times of the year, with each time offering its own advantages and disadvantages. Thought should be given to when a meadow is mowed, because mowing at different times of the year can produce very different results. Meadows are typically cut to a height of 6 to 12 inches. Early spring mowing (March 1 - April 10) allows meadows to retain cover during the winter for wildlife and is recommended when attracting and maintaining wildlife is the goal. June mowing (2nd or 3rd week) can produce a high-quality hay crop but eliminates the midsummer blooms and disturbs ground-nesting birds, which reproduce this time of year. Late fall mowing (last week of November) allows the meadow vegetation to set seed. The entire blooming season can be enjoyed, but winter cover and food is lost for wildlife.

Compared to traditional lawn areas, naturalized meadows in LPD open space require less maintenance work and time, use less energy, and are less costly. Maintenance costs are reduced because fewer fertilizers, pesticides, and water are needed. Mowing time is also reduced. If a meadow is to be retained or created in LPD open space, its size, location, and planting and mowing schedule should be described in the landscape management plan.



Woodlands are biological communities or ecosystems that are dominated by trees and other woody plants.

WOODLANDS

Woodlands provide LPD communities with scenic beauty, privacy, and recreational opportunities such as hiking and bird watching. These natural landscapes also offer environmental and ecological benefits such as climate control, erosion control, water and air purification, and food and habitat for wildlife.

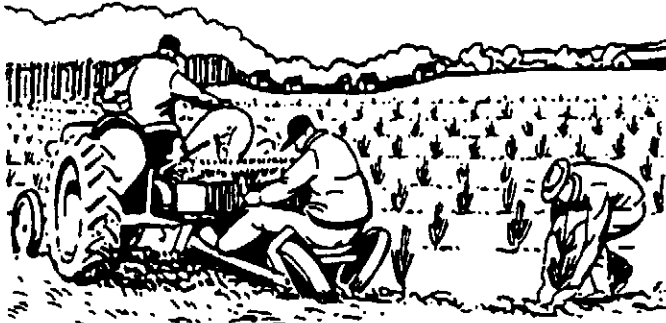
Woodlands are biological communities or ecosystems that are dominated by trees and other woody plants. The tops, or crowns, of the trees grow close enough together to create dense shade in the understory. This causes the natural loss of lower branches due to lack of sunlight. Another characteristic of woodlands is the accumulation of organic material, such as leaves, twigs, bark, fruits, flowers and seeds, that cover the woodland floor. Within LPD open space, existing woodlands may be preserved or created through planting.

Natural Development of Woodlands

Woodlands are the end result of the successional cycle. Succession, as previously described, is the orderly and progressive replacement of one plant community by another until a stable or "climax" community is established. Succession progresses from meadows to shrubs and eventually to trees. Just as shrubs invade meadows, shading the grasses and wildflowers, small trees grow and shade the shrubs. This begins the long process of creating woodlands. For several years small trees such as aspen, cherry, and white pine grow, with the shrubs. These trees are called "intolerant" tree species because they require full sun to survive. As these intolerant trees mature, they shade the understory. The growth of their own seedlings and the remaining sun-loving shrubs are restricted. This allows more shade-tolerant tree species to grow, eventually replacing the intolerant trees and creating a climax woodland. A climax woodland may take up to 150 years to fully establish. This is why mature woodlands should be preserved whenever possible.

Woodland Maintenance

Established woodlands should be monitored annually for possible illegal trash dumping, damage from deer over browsing, and invasive plants. Invasive plants, such as Japanese honeysuckle, Oriental bittersweet, Norway maples etc., should be removed. Replanting of tree seedlings and shrubs may be needed if damage from deer is extensive.



Source: Modified, Ponds and Lakes, The Urban Institute

Planting tree seedlings to create woodlands is used when natural regeneration is not successful or the acceleration of the growth of trees is desired.

Reforestation

Planting tree seedlings is recommended when natural regeneration is not successful or the acceleration of the growth of trees is desirable. A woodland established by artificial planting is commonly called a plantation. Tree seedlings can successfully grow on poor as well as fertile soils, on steep slopes and rocky hillsides, and most easily on agricultural lands. The species selected to be planted in any open space depends on existing conditions of the site, such as soil type, climate, and any insect or disease problems in the area. When planting in poorer soils, conifers or evergreen seedlings will do best. Hardwood tree seedlings, such as oaks, maples, and ash, require more productive soils to grow.

A higher rate of survival is achieved when all competitive vegetation is removed before planting. This vegetation competes for valuable nutrients and water and provides habitat and food for animals and insects that may damage newly planted seedlings. Competing vegetation is removed by either mechanical or chemical applications. Vegetation may be removed mechanically by plowing or discing the entire area to be planted or by plowing furrows only where the seedlings will be planted. During any planting, it is common for only 75 percent of seedlings to survive to the end of the first season. If more than 30 percent of the seedlings die, some replanting will be needed the following year.

Tree Planting

A forestry professional should be consulted before undertaking any tree planting. The local Bureau of Forestry District Office or Cooperative Extension Office can provide information and assistance. Upon request, foresters from these offices will examine woodlands, help with management plans, make tree planting recommendations, and offer advice on soil erosion techniques and wildlife habitat. Some of these services are performed at no charge or for a small fee.

When planting woodlands, using seedlings is the most cost effective. Larger trees may be planted, but the cost of plants and the maintenance required are usually prohibitive. Tree seedlings should be planted in the spring from mid-March to May. Damage caused by frost heaving and drying winter winds makes fall planting unreliable. Trees selected for planting are usually nursery grown, one-to three-year-old, bare-root seedlings. Tree seedlings can be purchased from state forest nurseries in heights that range from 4 to 16 inches. Seedlings planted in open fields are typically planted

in grids, most commonly in rows 8 feet apart with 8 feet between rows. Using a wider spacing of 10 to 14 feet is also suitable when planting some hardwood tree seedlings. Typical spacing for planting seedlings ranges from a 6-foot x 6-foot grid to a 14-foot x 14-foot grid.

To determine the number of seedlings to plant, the Bureau of Forestry of the Department of Environmental Resources, uses the following formula.

The number of plants required per acre equals:

$$\frac{43,560 \text{ (square feet in an acre)}}{\text{spacing in row} \times \text{spacing between rows}}$$

The typical number of seedlings per acre ranges between 680 trees per acre using a 8-foot X 8-foot grid and 222 using a 14-foot X 14-foot grid.

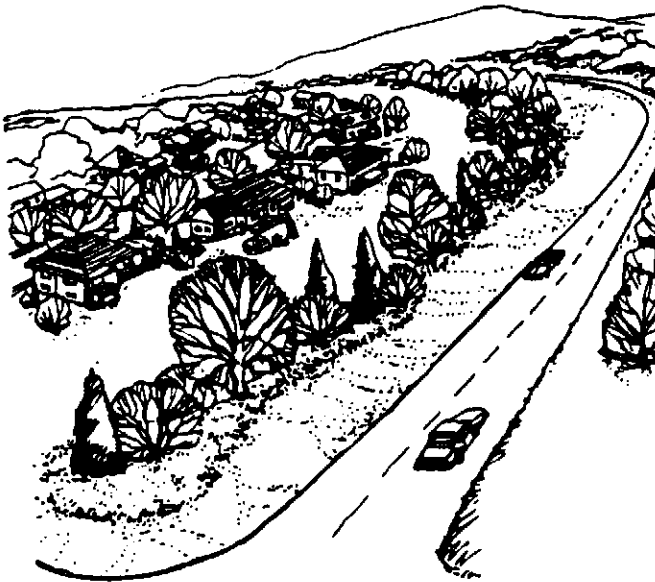
When planting in large open space areas, mixing tree species eliminates monocultures (the planting of a single species), thus reducing the spread of insects and disease. The Bureau of Forestry recommends planting one species for 8 rows, then changing to another. Tree species should be compatible in habit and growth rate so that shading or crowding is not a problem. Seedlings can be planted by hand or by machine. Using machines saves time by allowing as many as 8,000 trees to be planted in one day. In existing woodlands, interplanting of seedlings is usually unsuccessful due to the excessive shade cast by existing plants. Only where the ground is exposed to full sunlight during most of the day will seedlings survive. In areas abundant with deer, seedlings should be protected by fencing. As the woodland grows, annual inspection for disease and invasive vegetation is needed.

Many factors should be evaluated when considering the establishment of woodlands in LPD open space. These include the proposed use of the area (visual, aesthetic, recreational, trails, etc.), the time frame involved, initial costs, and maintenance requirements. Deciding on general management goals for the proposed woodland is an important first step in development and preservation. Planting steep-sloped areas (slopes greater than 20 percent) with trees helps protect these environmentally sensitive landscape features, while creating a woodland for LPD residents to enjoy. Woodlands are valuable amenities in LPD developments. If preserved and managed effectively, they will serve the community and its residents for many years.

HEDGEROWS



Hedgerows should be preserved and incorporated into the design of LPD communities as either part of the open space or as buffers between residential and open space uses.



If hedgerows do not exist on site, they can be created by planting.

Hedgerows on LPD sites should be preserved and incorporated into the design of the LPD development, either as part of the open space or as buffers between residential and open space uses. These are natural or planted narrow rows of shrubs and trees which usually enclose or separate agricultural fields. Hedgerows add visual diversity to agricultural landscapes by breaking up the large expanses of cultivated fields. They may be prominent features of the existing landscape and the only wooded habitat nearby. Preserving these naturalized landscapes helps sustain the rural character of the site. Hedgerows can function as windbreaks and were often originally planted for this purpose. Their vegetation reduces wind velocities, protecting topsoil and reducing soil moisture loss. Usually linear in form, hedgerows may act as corridors linking other open space areas together. This creates an overall open space network connecting pockets of open space on adjacent tracts and throughout the area. These corridors can be used as greenways for residents or travel lanes for wildlife. Depending on their width and type of vegetation, hedgerows can provide valuable wildlife habitat.

Hedgerows sometimes become overgrown with invasive plants that should be removed, especially vines. Restoring deteriorating hedgerows by replanting any gaps with native trees and shrubs is recommended. The spacing of the new plant material should be close enough to form an overhead canopy but allow enough area for the removal of invasive vegetation. Protecting all newly planted vegetation by fencing is recommended to minimize damage from wildlife. A spacing of 10 to 14 feet for trees is suggested.

If hedgerows do not exist, they can be created by planting. By using the landscape requirements for buffers outlined in the subdivision and land development regulations and native plant species, naturalized hedgerows can be developed over time. Hedgerows are an integral part of the rural landscape in Montgomery County. Preserving and maintaining them in LPD communities helps integrate new development into the surrounding landscape.



Source: Modified, *Ponds and Lakes*, The Urban Institute

Ponds can serve a dual purpose as both site amenities and stormwater detention facilities.



Source: Modified, *Ponds and Lakes*, The Urban Institute

Within a year or two, newly constructed ponds become naturalized with native plants and wildlife.

PONDS

Ponds can be very attractive features in an LPD development, forming a focus for the community or within the open space. Also, they can also serve a dual purpose as both an amenity and a stormwater detention facility.

A pond functioning to detain stormwater will be designed to maintain a normal water level lower than that reached during a storm. The pond area is graded to allow the water level to rise enough to detain the required amount of stormwater. This is in contrast to a normal detention basin, where most or all of the water eventually flows out.

Pond Creation

A pond is formed by either damming a stream or by excavating an already low-lying area. Ponds can be fed by underground springs as well as surface drainage. Water level is maintained by a standpipe into which water drains when it reaches a certain level. The height of the standpipe determines the depth of the water. Some ponds are constructed without a standpipe, allowing the water to escape the pond via a spillway over the dam. This is less desirable than a standpipe, due to the danger of washing out the dam in case of flooding conditions. Also, a pond with a spillway will not have the capacity to double as a stormwater detention facility. Whether a standpipe or a spillway is used to determine the water level in a pond, an additional emergency spillway should be constructed to allow for unusually heavy accumulations of stormwater. With an emergency spillway, excess water can be safely channeled away without the danger of washing out the dam.

Since ponds are costly to build (construction consists primarily of grading and standpipe installation), it is not likely that a homeowners' association will choose to undergo this expense. If a pond is to become a part of an LPD community, the developer would usually build it as an amenity. The pond should be contained wholly within common open space, never within individual lot areas. This includes any graded area which contributes to the form of the pond, not just the area of the water. However, shallow swales feeding the pond could cross lot areas.

After new construction, the pond would become naturalized on its own within a year or two. They also can be stocked with fish purchased from a hatchery. Suitable plants will establish themselves and animal life will move in. Even if a pond is not stocked, fish will appear, brought in as eggs clinging to the legs of birds.

Pond Maintenance

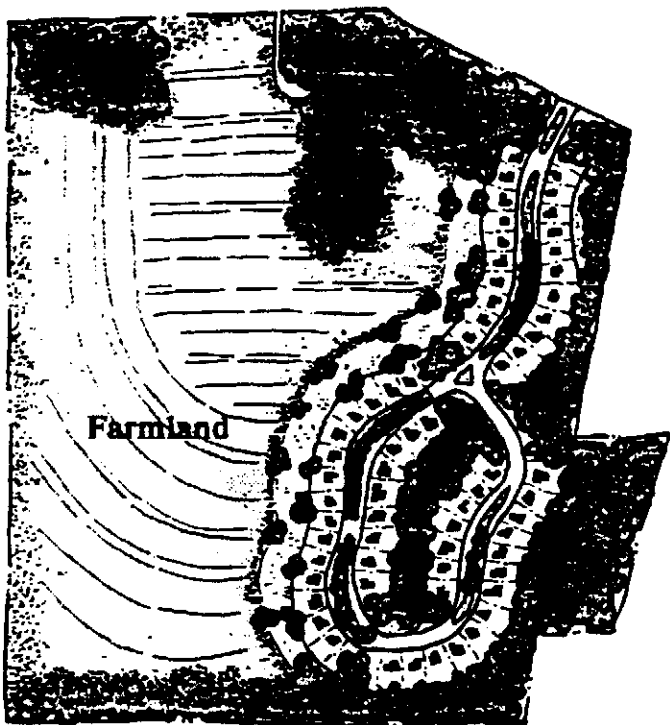
Maintenance requirements for ponds are not high if the pond is properly built. It must have an adequate depth and flow to avoid stagnation and support plant and animal (primarily fish) life. The sides must be graded for easy mowing and access to the water. Many farm ponds exist for 20 years or more without any major maintenance. Occasional dredging (after 10 or 20 years) may be needed, but only if sedimentation from surrounding farm fields is a problem. Sedimentation can be reduced by installing a sedimentation basin just upstream of the pond. Silt settles in the basin before the water enters the pond. Also, upstream wetland planting, sometimes called a "forebay," can greatly reduce sedimentation. To control algae bloom, occasional chemical treatment may be needed. Maintaining natural meadows or woodlands around a pond helps filter runoff, prevents erosion, and absorbs fertilizers or other pollutants before they enter the pond.

The need for repairs to the standpipe structure is rare.

Muskrats can sometimes be a problem by burrowing into a dam wall far enough to actually allow water to escape through the dam and eventually wash out the dam. Protective wire mesh laid against the dam wall, underwater as well as above, can stop the burrowing.

If a pond is to serve as an aesthetic feature of the community, fencing it should be avoided. However, proper liability insurance should be carried by the homeowners' association. Gently-sloping banks and terraces can minimize any dangers. Ponds can provide very pleasing recreational and aesthetic opportunities for LPD residents and fulfill functional needs as well. The landscape management plan should address all functions of a pond: stormwater management, plant and wildlife management, recreational use, and maintenance.

AGRICULTURAL LANDSCAPES



Productive farm fields can be preserved by locating homes in the existing woodland.

The LPD and Farmland Preservation

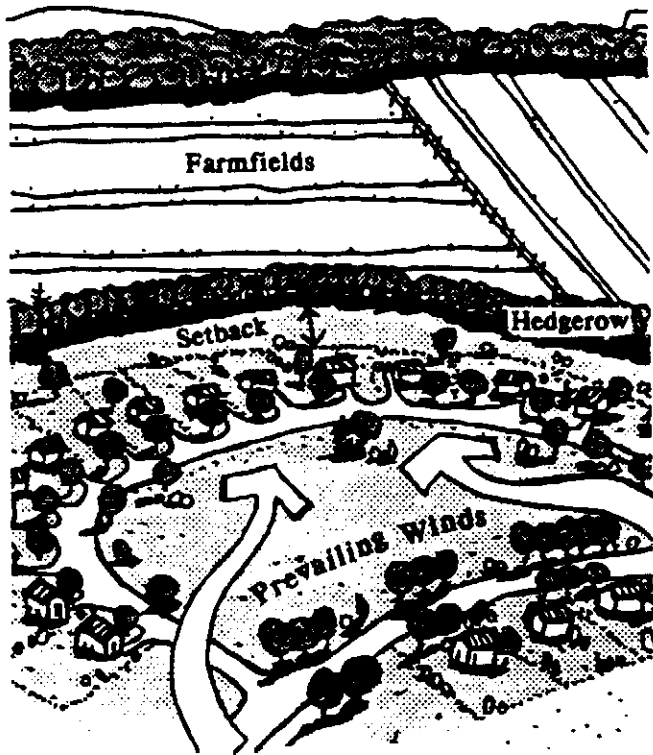
Farming may seem to be a natural use for LPD open space, but the ability to create and sustain productive farmland in the open space depends on many factors. These include the suitability of the land and the economics of the local farming community, as well as the ability to successfully integrate farming with nearby residential uses.

The LPD was not designed as a primary method of farmland preservation within a municipality. It should, instead, supplement the many other existing techniques available to preserve agriculture. Such strategies include agricultural zoning, urban growth boundaries, preferential tax assessments for farmland, credits against state income tax, federal and state estate tax benefits, right-to-farm legislation, private land trusts, easements, farmland conservancies, and purchase or transfer of development rights. A purchase of development rights program is currently under way in Montgomery County, under Act 43 of 1987, as amended by Act 149 of 1988 (known as the Agricultural Security Area Law).

However, with a proper understanding of the nature of agriculture, the needs of the farmer, and effective means for buffering its impacts, it is possible to integrate certain kinds of farming with residential uses.

Understanding Agriculture

Agriculture should be viewed as an industry with a number of activities that are not compatible with residential development. Dust, fumes, odors, chemicals, and noise from machinery and animals, as well as long operating hours, can become problematic when occurring close to residential development. While the situation is sometimes unpleasant for the suburban homeowner, the farmer also suffers by having his normal farming activities hampered. Nuisance complaints, pollution (runoff from paved surface or malfunctioning on-site septic systems, etc.), traffic congestion, vandalism (damage to crops, animals, or equipment), harassment, trespass (by hunters, hikers, off-road vehicles, horseback riders, and pets), uninvited woodland cutting, and other possible conflicts may dissuade the farmer from choosing an LPD field for farming.



Site planning techniques such as establishing setbacks from farm fields, using vegetation as screens, and proper placement of homes can mitigate the adverse impacts of farming operations on adjacent residents.

Mitigation by Site Planning

Simple site planning techniques can be quite effective in helping to mitigate some of the impacts of farming operations. For example, a corn harvester can create a great deal of dust during operation. A 200-foot setback from a neighboring rear yard can help a great deal in alleviating a potential conflict between the farmer and the residents. Likewise, proper vegetative screens or hedgerows can help trap dust or flying debris. Prevailing wind directions should be kept in mind. If residential clusters are located downwind from a field, it should not be considered for farming activities that regularly create dust or odors. Even the seasonal spreading of manure can become obnoxious to residents. Similarly, drainage patterns should be considered when planning recreational uses for ponds or creeks located below those fields. Runoff containing manure or fertilizers will adversely affect these facilities.

Understanding the natural conditions that exist on potential farm fields and how they will relate to nearby residents will direct choices regarding the type of farming allowed.

Substantial setbacks, preservation of existing vegetation, creation of new buffers where needed, consideration of the direction of prevailing winds and drainage, and good location choices are all important in eliminating or reducing potential conflicts between residents and farmers.

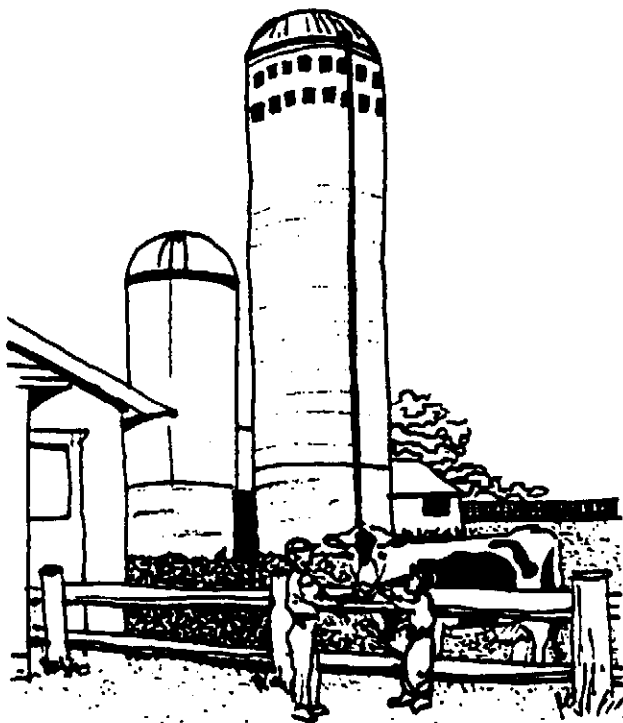
Agreements with the Farmer

Whether the open space is owned by a residents' organization (a homeowners' association or condominium association), a private conservation organization, or the municipality, any contemplated farming activity should be formalized in a written agreement with the farmer. The goal of the agreement is to increase understanding of the farming activity for the nonfarmer. This should keep any potential conflicts between farmer and resident at a minimum. Regardless of who owns the farmed area, farming will not work successfully if residents find it difficult to live with and the farmer feels harassed by the residents.

Once the residents of an LPD development have agreed they would like to see farming take place in the open space, a lease should be drawn or other formal agreement should be reached with the interested farmer for the use of the fields for specific farming activities and for a specified length of time. Any and all restrictions should be stipulated. It must be remembered, however, that flexibility is important to the farmer; it may be difficult to find a lessee if the restrictions are too great. The limitations placed on the farmer's activities must be agreeable to both the farmer and the residents.



Rotating crops for the health of the field, or to respond to market changes, may be necessary.



Residents should understand all proposed farming activities.

Whatever type of agricultural operation is chosen, it is important that the nature of any proposed farming activities be understood by the residents. The impacts on the community of all activities involved with the proposed farming of various crops or the keeping of animals must be considered. The farmer should clearly describe all activities including the use of equipment and chemicals, the timing of these activities, and any flexibility needed in the execution of the activities.

Below are some of the primary issues that should be addressed in the lease agreement:

- A farmer usually will not want to commit to the use of a field for only one season, nor should this be agreed to. Applications of lime, fertilizers, and herbicides are often effective into the following year and build up in the soil for maximum effectiveness. Farmers with only a one-year lease on a field will not invest in treatments that will preserve the health of the field. They simply will take from the field whatever profits it can yield in one year, untreated. Shortterm leases will tend, over time, to reduce the health and productivity of a farm field.

It is also not desirable to commit to a time period that is too long. A problem could occur with the farming operation where it would be desirable to end the lease. A time period of three to five years should be suitable.

- A farmer may want to rotate crops for the health of the field or to respond to changes in market conditions. Proper rotation of crops protects the health and productivity of the soil. Residents should understand the impacts of farming different crops.
- There should be an understanding as to what condition the fields will be left in over the winter (bare soil, winter wheat, corn stubble, etc.). Each of these conditions will have a different appearance and a different impact on erosion. It is also important to address whether fields can be used for winter storage of farming equipment and agricultural products, such as hay.
- The agreement should include provisions for keeping residents, children, and pets out of the leased areas. Restricting resident access is important for protecting the farmer's crops and overall investment.
- All aspects of the keeping of animals should be understood (the number of animals, feeding procedures, truck access, grazing rotations, handling of manure, electric vs. nonelectric fencing, etc.).

- The farming operations for all crops should be understood by the residents. These include plowing, discing, cultivating, spraying, harvesting, spreading of fertilizers (including manure), or the packing, processing, treating or storing of farm products.
- Residents may choose to place restrictions on the hours during which the farmer may conduct certain activities, keeping in mind that flexibility is crucial to the farmer's operations. Most farmers consider the full 24 hours a day and seven days a week available for working.

Conservation Practices

The owner of the open space should have a conservation plan for the farm areas from the Montgomery County Conservation District. This plan should be implemented by the farmer. Such plans usually include erosion control measures and other elements that work toward maintaining the productivity of the soil and the health of any existing creeks or ponds.

If the LPD tract has creeks or ponds, thought should be given to the proximity of the farm fields. Topsoil erosion and stormwater runoff containing farming fertilizers (including manure) are the two greatest polluting agents of ponds and streams. The fertilizers cause rapid growth of algae, which leads to eutrophication (suffocation of other plant and animal life due to lack of oxygen). Locating expanses of meadows or other nonfertilized areas around ponds and the drainageways leading to them, helps to filter runoff, contain soil, and absorb fertilizers. These buffers should be 25- to 100-feet-wide around ponds and 25-to-100-feet on each side of a drainageway. These issues as they relate to a specific site would be addressed in a conservation plan for the site.

Rental Fees

Generally, land rents in Montgomery County are not high (approximately \$20 to \$50 per acre). Rents or other costs charged to the farmer for the use of farm fields could be paid in the form of services provided by the farmer, rather than in cash (i.e., mowing of common open space, plowing community gardens, maintenance of woodland areas, etc). Also, the farmer could be credited for the expenses involved in long-term agricultural best-management practices installed in accordance with a conservation plan. (For example, installing underground field tile to improve drainage, constructing diversion terraces to control erosion, improving swales or drainageways, and constructing sedimentation basins or stormwater detention basins, etc.).

INFRASTRUCTURE

An important use that must take place within LPD open space, but does not fall under the typical recreational or aesthetic category is infrastructure. Infrastructure includes stormwater facilities, sewage disposal systems, water supply systems, and roadways. All of these utilitarian uses require significant site disturbance for installation, including removal of vegetation and grading.

Because the goal of the LPD is to retain the existing rural character as much as possible, the final grading and revegetation of these areas must fit into the natural environment. Artificial-looking berms and formal plantings should be avoided. When locating these facilities, environmentally sensitive areas and scenic areas should be avoided.

The landscape management plan should specify any functional restrictions that apply to maintaining these facilities. For example, septic disposal fields located in open space, should be maintained in grass or naturalized meadows. The engineering needs of the infrastructure must be balanced with the aesthetic and ecological concerns of the overall LPD development.



Well-designed stormwater basins are integrated into their surroundings to complement rather than disrupt the natural character of the site.

STORMWATER BASINS

A well-designed stormwater basin should be integrated into its surroundings to complement the natural character of the site. The most effective basin is barely recognizable because of how well it fits into its surroundings. A basin's location, form, and landscaping are essential to integrating this feature into the LPD open space. The size of basins will vary with individual site conditions and water storage objectives. A basin may be many acres in size or as small as 100 square feet.

Basin Location

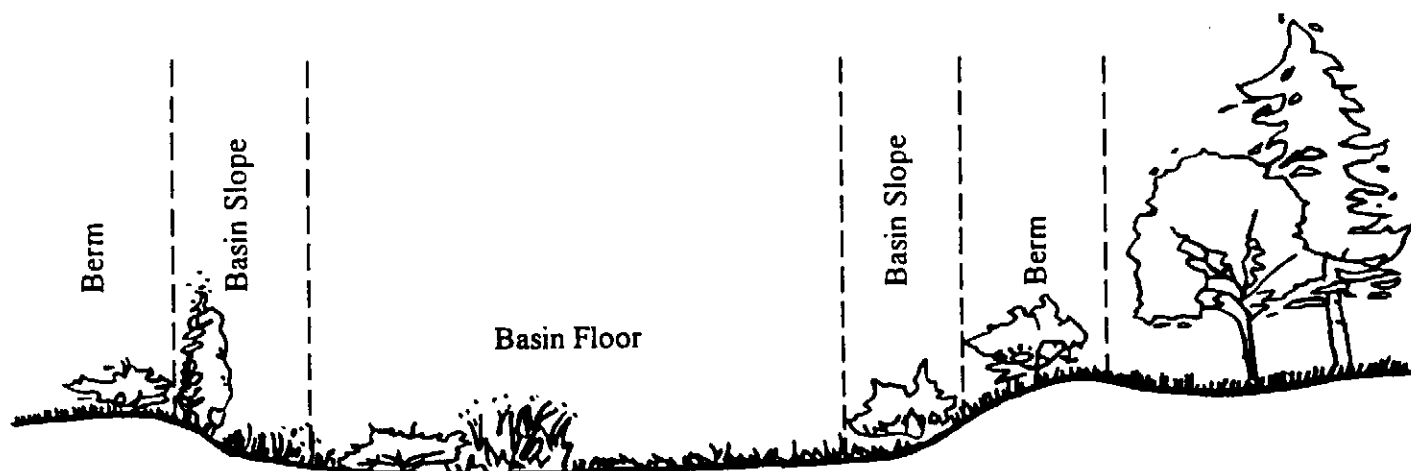
A basin's location within LPD open space is critical to its overall role in the site design for the community. Basins need not be hidden from view. If correctly designed, they may be an asset to the development. Basins should be integrated into the natural contours of the site and located based on geologic, topographic, and soil conditions. They should be planned to avoid excessive grading, clearing of natural vegetation, and alteration of water-courses or wetlands. Carefully placed basins help reduce soil erosion and preserve the rural character of the open space. Locating basins within the LPD open space is preferable to on individual lots. Basins may be located within required setback areas where they help buffer the LPD community from adjacent roads or neighboring uses.

Properly designed basins can be used for more than just controlling stormwater. Multiple use basins in LPD communities can be used for wildlife habitat, irrigation, ice skating, and as a scenic amenity for residents. When basins are used as ponds with a permanent water level, they should be visible to serve as a focal point and community amenity.

The form or layout of the basin should harmonize with the surrounding landscape. In rural areas, curvilinear forms tend to blend better with the surrounding landscape than more rigid rectilinear forms. The scale of the facility should complement the overall design of the site. A small, very deep, rectangular basin located in a rolling open space landscape would be out of scale and not easily integrated into the natural terrain. For mowing purposes gradual slopes of greater than 5:1 or 20 percent are preferred, with a maximum of 3:1 or 33 percent.

Basin Landscaping

When landscaping a basin, the primary goal is to integrate the facility into the existing natural landscape. Planting the same shrubs and trees that appear around the basin within the basin helps to blend the facility into the landscape. This helps remove any artificial edge created by the construction of the basin. Informal plantings on basin slopes can effectively soften basin edges and reduce the perceived expanse of the basin. It is important to carefully select the species of plants used in a basin, given the environmental stresses caused on a plant by the wet and dry soil conditions of the basin. Some native wetland plant species are effective for landscaping the bottom of basins. Basins can be successful when located in existing woodlands when the existing forested cover is maintained in the basin itself.



It is important to blend a basin into the existing landscape by using informal planting of vegetation to soften basin edges and slopes.

All disturbed areas in the basin should be planted in cover vegetation such as grass, wildflowers, or appropriate shrubs and trees. The type of vegetation selected will determine the level and type of maintenance required for the basin. For example, planting native meadows suitable for both wet and dry conditions requires mowing only two or three times a year. The landscaping used in basins should help reduce the maintenance requirements for the facility. Native vegetation is recommended to aid in reducing maintenance time and cost. Trees should not be planted on the basin berm or dam. Shrubs may be located in these areas instead. Tree roots can create pathways for water seepage that may undermine berm construction.

Basin Access and Safety

Safety and access are important considerations in basin design. Basins tend to be relatively inexpensive to construct. Maintenance costs may vary. Proper maintenance is critical for a basin's aesthetics and its ability to function.

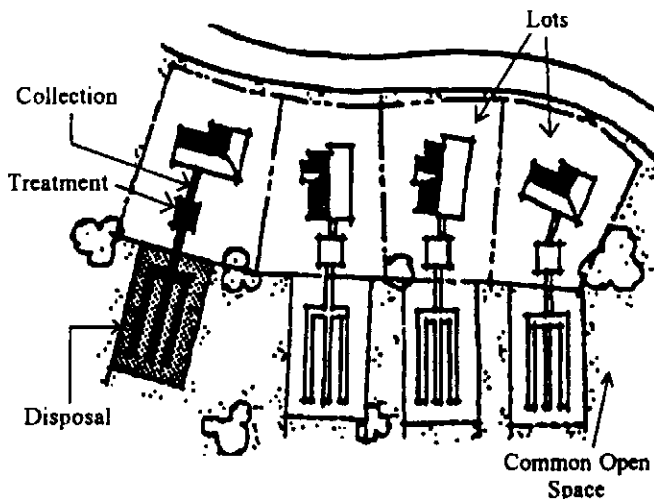
Accessibility to the basin is critical for routine maintenance. An accessway for maintenance vehicles should be provided. This does not have to be a paved roadway. A stabilized road bed is sufficient. A routine maintenance schedule for the basin should be included in the landscape management plan. The areas specified for maintenance should include the embankment, emergency spillway, outlet structure, and any landscaping.

Safety is an important consideration in basin design. By designing basins carefully, the threat of loss of life or property damage can be almost eliminated. One of the worst fears about any water body is the threat of a child drowning. Some municipalities have ordinances requiring fencing around stormwater basins. However, a well-designed basin should not require fencing to be safe. Instead, with proper design of the slopes and depth, particularly if the basin is a wet pond, safety would be insured. More gradually sloped banks, at least 5:1 or greater, are recommended. The basin should not be deep. The depth and location of a basin are safety considerations in its construction.

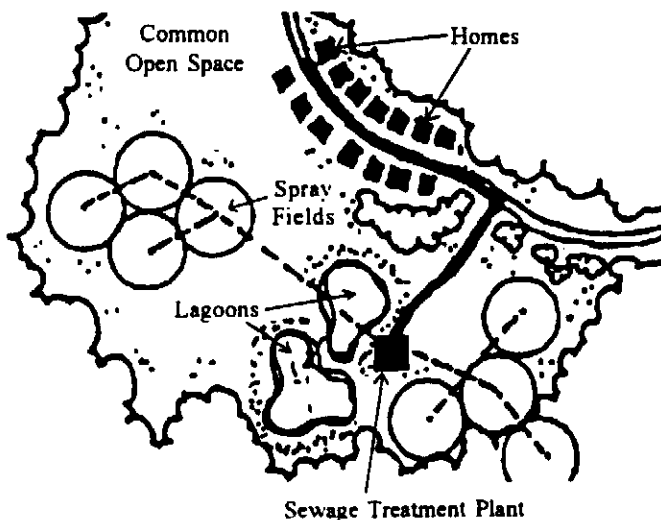
More detailed information is available on stormwater basins in the Montgomery County Planning Commission brochure, "Stormwater Basins: Making Them More Functional and Attractive."

SEWAGE FACILITIES

A very important use for LPD open space is to serve as a location for the development's sewage facilities. Since many of the areas where the LPD will be applied may not have public sewers, other methods for providing sewage treatment are needed. As outlined in the LPD companion brochure, "Land Preservation District Sewage Treatment Alternatives," there are three methods for providing sewage treatment and disposal to LPD communities. These include individual systems, community systems, and public systems. Using any of these systems may require placement of sewage facilities within the LPD open space. The use of individual systems will be limited by the soils in some areas and the small LPD lot size requirement that ranges from 6,000 square feet to 10,000 square feet. Where soils are unsuitable for individual systems, a centralized community system will be necessary. Public sewers can also be utilized in limited areas where they serve LPD communities.



In an Individual System disposal fields can be located in common open space.



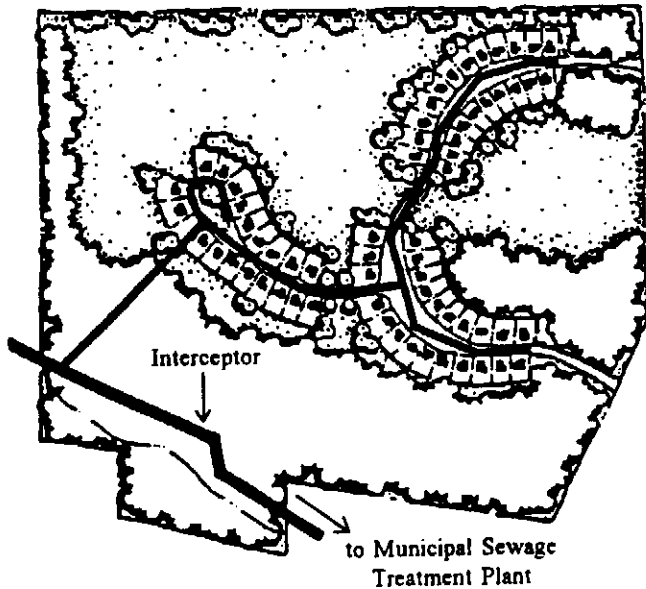
In a Community System treatment and disposal can be located in common open space.

Individual Systems

Installing individual on-lot subsurface sewage systems entirely on individual lots is not possible in an LPD development, due to the small lot size and the area needed for the disposal field. However, disposal fields can be located in the adjacent open space. These disposal fields may be absorption beds such as elevated sand mounds. Individual sewage treatment systems can be connected to drainfields that are shared by two or more lots. These common drainfields are located in the open space. In this example, the open space is used for effluent disposal, but treatment takes place on the individual lots.

Community Systems

A nonpublic centralized community system collects and treats sewage from individual lots at a centralized location and disposes of the treated effluent in the open space. Both treatment and disposal would be located in the open space. The large amount of open space provided in LPD developments is well suited for a lagoon treatment system or marsh-pond system with either stream discharge or spray irrigation of the effluent. The lagoon system utilizes several ponds located in the open space and disposes of the effluent by spraying it on existing fields or woodlands. A marsh-pond system combines a created wetland/marsh with ponds in the biological break-down of the sewage. These ponds and marshes can be integrated into the overall site design of the LPD open space. Other options for the discharge of effluent, such as wetland discharge or crop irrigation, represent other viable disposal methods using the open space area, but these applications are limited in their use.



In a Public System sewer lines or pump stations can be located in the open space.

Public Sewers

If public sewers are provided to LPD developments, the open space may be used for facilities such as pump stations or interceptor lines. Sewer lines may be located in the open space or parallel to the road rights-of-way, depending on the design of the system.

More detailed information on sewage facilities can be found in the Montgomery County Planning Commission brochures entitled: "Sewage Facilities: Understanding the Alternatives" and "Land Preservation District Sewage Treatment Alternatives."

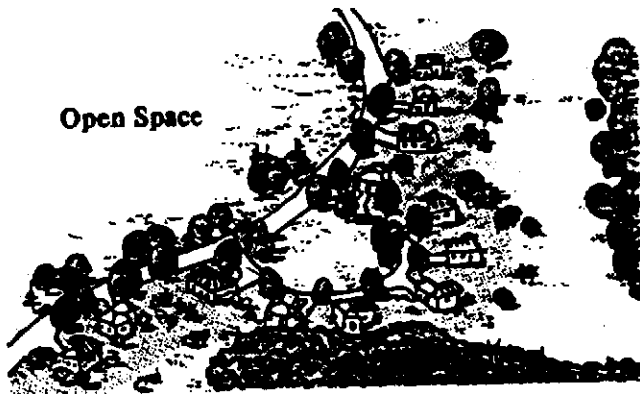
Water Supply Systems

Installing individual on-lot wells on each LPD lot is not possible, due to the small lot size requirement of the LPD. A community well or wells are needed to serve the residential lots. All wells should be placed in the open space. Only a small area, adequate to accommodate the wellhead and pump house, is required.

If public water is available, depending on the layout of the system, water lines may be located within the open space.

ROADS

Roads will cross portions of the LPD open space to connect neighborhoods. It is important to consider the relationship of roads to the open space. Constructing roads to follow the site's existing contours reduces the amount of grading needed and integrates the road in the existing landscape. If possible, roads should be sited away from environmentally sensitive areas such as wetlands and floodplain. Roads that follow natural features, such as rivers, valleys, ridges or woodland, and meadow edges, provide views into these areas. A roadway located along a ridge line provides expansive views across the site and a scenic drive through the community. The location of roads is instrumental in preserving and accentuating the best features of the open space.



Roads will cross portions of the open space to connect neighborhoods. The location of roadways is critical in preserving and accentuating the best features of the open space.

LANDSCAPE MANAGEMENT PLAN

Since 75 percent of an LPD development consists of open space, a good landscape management plan is essential for ensuring a successful LPD community. It should clearly answer the question, What is going to happen in that large area of open space? The municipality and prospective homebuyers within the development need to have the same understanding of the long-term character of the open space. For example, homebuyers need to know whether an agricultural use will be continued near their prospective lot, and a municipality needs to know that the meadow preserved adjacent to its park will always be a meadow. Likewise, if an existing meadow is to be allowed to revert to a woodland over 20 years, this should be understood by all parties concerned. The plan provides the municipality and the LPD homeowners' association with the framework to implement the long-term management strategies for the open space.

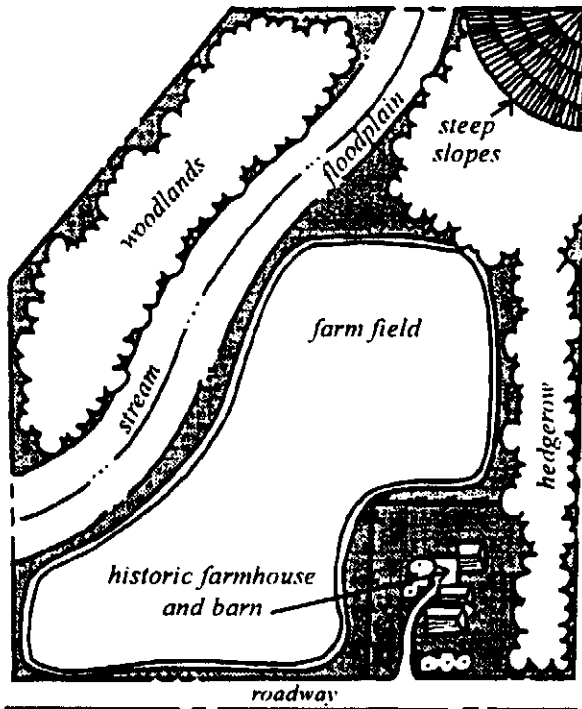
Whether the open space is public or private, the municipality should actively participate in identifying the appropriate goals for the open space and should review the proposed management strategies. By approving a landscape management plan, the municipality is agreeing with the open space goals within the LPD community and understands how this open space fits into the overall open space of the municipality. The plan implements the goals of the municipality's open space plan as they apply to the LPD tract, while addressing the development's environmental and recreational needs.

A landscape management plan outlines the existing condition, proposed use, and long-term management strategies for the open space. It consists of three basic elements:

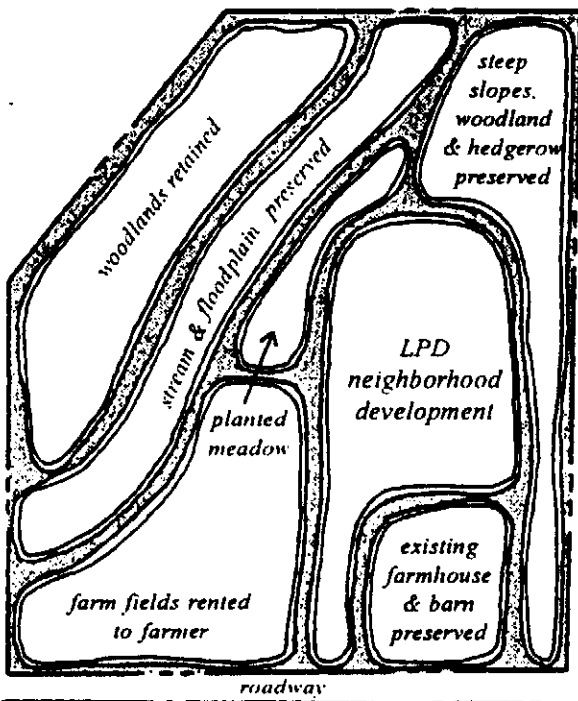
- A detailed site analysis of existing conditions in plan form with text.
- A schematic plan with text describing the open space goals and objectives.
- A discussion of the maintenance and land management operations required for reaching the goals.

Buffers, setbacks, detention basins, and neighborhood open space should be included in the plan, in addition to the larger open space areas. The traditionally more manicured areas directly around homes need not be included.

Site Analysis



Schematic Plan



The Site Analysis

The first section of a landscape plan is a detailed site analysis of the existing conditions on the LPD tract. It includes all the natural, historic, cultural, and scenic resources. A description of the current condition of these resources is also needed. The natural resources commonly mapped include topography (including steep slopes over 15 percent); soil types; water features such as ponds, streams, or drainageways; floodplain; wetlands; and vegetation including woodlands, hedgerows, pastures, or meadows. The description of the condition of existing natural resources should include identification of all tree and shrub species, location of wildlife habitat, and determination of the current health of the living resources. Historic, cultural, and scenic resources consist of places or structures that have contributed to the community's heritage or sense of character. Historic resources include architectural structures such as barns, churches, residences, and commercial and industrial buildings. Examples of cultural and scenic amenities on LPD tracts are bridges, trees, streams, spring-houses, cemeteries, and scenic views.

The Schematic Plan

The second section of the management plan identifies the landscapes to be preserved or newly created within the open space. A schematic drawing outlines the location and approximate size of the area where a natural, naturalized, agricultural, or manicured landscape will be preserved or created. For example, areas are delineated that will be farmed, created as meadows, or preserved as woodlands. The plan also describes the specific goals and objectives for the open space. This section explains how certain landscapes in the open space will be created or maintained. For example, an open space goal may be to create a buffer between agricultural uses and residential homes by restoring a deteriorating hedgerow. The schematic plan addresses how this goal is achieved. It also shows a comprehensive listing of the objectives needed to reach the goal. These objectives may include removing invasive vegetation which overran the hedgerow and replanting existing gaps along the hedgerow with native tree and shrub species. Another goal for an area may be converting an existing lawn to a natural meadow. This may be done by simply not mowing the area and allowing the natural processes of succession to take over.

Land Management and Operation Strategies

The final section of the plan includes all restoration, maintenance, and operational schedules for the open space. This section specifies all the actions, budget requirements,

maintenance, and operational activities required for the various landscapes in the open space. Details for restoration measures for existing vegetation would include application of herbicides, identification of invasive plants to be removed, and required spacing for newly planted trees. All other activities necessary to reach the goals stated in the schematic plan should be referenced. These may include mowing schedules, farming practices, tree and shrub plantings, renovations to structures, and all other related functions. This section also specifies all routine maintenance requirements for each landscape type and provides the framework for enforcement by the LPD homeowner's association and the municipality.

How Does the Management Plan Fit into Local Ordinances and the Review Process?

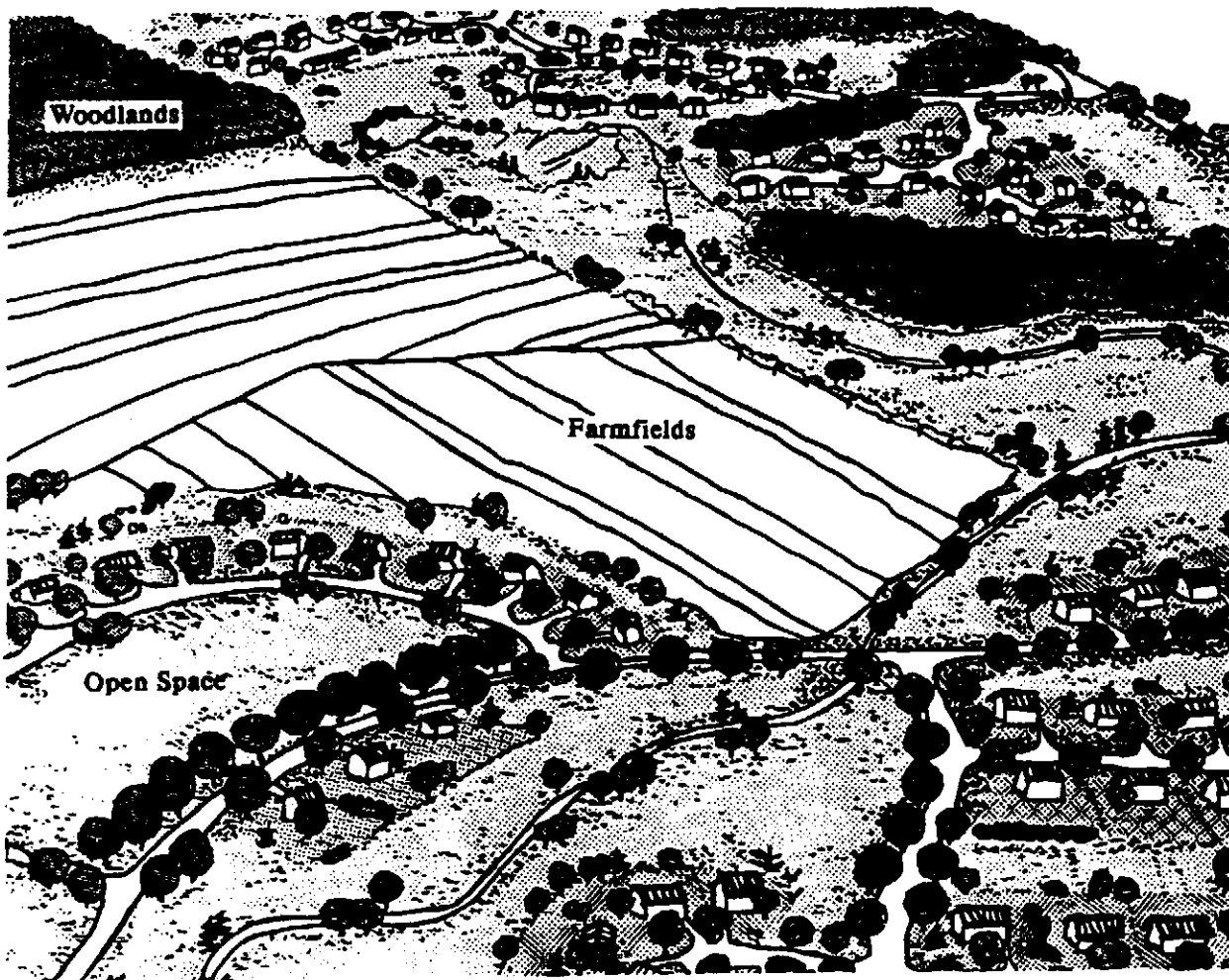
The requirement for including a landscape management plan should be written into the local zoning ordinance as part of the text describing the requirements for LPD development, just as a traffic impact study or fiscal analysis study might be required for other types of development. However, the specific requirements for the study itself should be listed in the local subdivision and land development ordinance.

The landscape management plan should be reviewed and approved by the municipality as part of the normal land development plan approval process for the LPD development, as spelled out in the municipal subdivision and land development ordinance. Final plans for the land development should not be approved until the landscape management plan is properly completed and can be approved at the same time.

Ideally, the applicant should work with the municipality throughout the development of the plan, so the municipality's open space goals will be met in the plan. The municipality may want to consult with the Montgomery County Conservation District or other professionals to determine the adequacy of a particular management plan. Any inadequacies, such as incompleteness or improper management practices, should be corrected by the applicant prior to approval.

SUMMARY

The goal of the LPD is to preserve open land, sensitive natural areas, and rural community character. How the open land is used and managed is an essential component to a successful LPD development and is important to municipalities, developers, and residents. This report discusses the three major landscape types, natural landscapes, naturalized landscapes, and agricultural landscapes which can be preserved or created in LPD open space, as well as the function of a landscape management plan, and the role of municipal open space planning in LPD development. The success of any LPD community for both residents and municipalities will depend on how the open space is used and managed.



Organizations to contact for additional information and assistance:

American Farmland Trust
1920 N Street, NW
Suite 400
Washington, DC 20036
(202) 659-5170

American Forestry Association
P.O. Box 2000
Washington D.C. 20013

Association of Consulting Foresters, Inc.
5410 Grosvenor Lane, Suite 205
Bethesda, Maryland 20814
(301) 530-6795

Brandywine Conservancy
P.O. Box 141
Chadds Ford, Pennsylvania 19317
(610) 459-1900

District 17 Forester
RD#4 Route 23
Pottstown, Pennsylvania 19464
(610) 469-6217

Montgomery County Soil Conservation Service
P.O. Box 380, Route 113
Creamery, Pennsylvania 19430
(610) 489-6071

Morris Arboretum
100 Northwestern Ave
Philadelphia, Pennsylvania 19118
(215) 247-5777

National Arbor Day Foundation
100 Arbor Avenue
Nebraska City, Nebraska 68410

Natural Lands Trust
Hildacy Farm
1031 Palmers Mill Road
Media, Pennsylvania 19063
(610) 353-5587

National Wildflower Research Center
2600 FM 973 North
Austin, Texas 78725
(512) 929-3600

National Institute for Urban Wildlife
10921 Trotting Ridge Way
Columbia, Maryland 21044
(301) 596-3311

National Woodlands Owners Association
374 Maple Avenue East, Suite 210
Vienna, Virginia 22180

Pennsylvania Bureau of Forestry,
Department of Environmental Resources
2150 Herr Street, P.O. Box 1467
Harrisburg, Pennsylvania 17120
(717) 787-2105

Pennsylvania Fish Commission
3532 Walnut Street
P.O. Box 1673
Harrisburg, Pennsylvania 17105
(717) 657-4542

Penn State College of Agricultural Sciences
Cooperative Extension Montgomery County
Box 20, 1015 Route 113
Creamery, Pennsylvania 19430
(610) 489-4315

Society of American Foresters
5400 Grosvenor Lane
Bethesda, Maryland 20814
(301) 897-8720

The Pennsylvania Forestry Association
410 East Main Street
Mechanicsburg, Pennsylvania 17055
(717) 766-5371

U.S. Department of Agriculture
Forestry Service
5 Radnor Corporate Center, Suite 200
P.O. Box 6775
Radnor, Pennsylvania 19087-8775
(610) 975-4139

Wildlife Habitat Enhancement Council
1010 Wayne Avenue, Suite 210
Silver Spring, Maryland 20910
(301) 588-8994

Wissahickon Valley Watershed Association
12 Morris Road
Ambler, Pennsylvania 19002
(215) 646-8866

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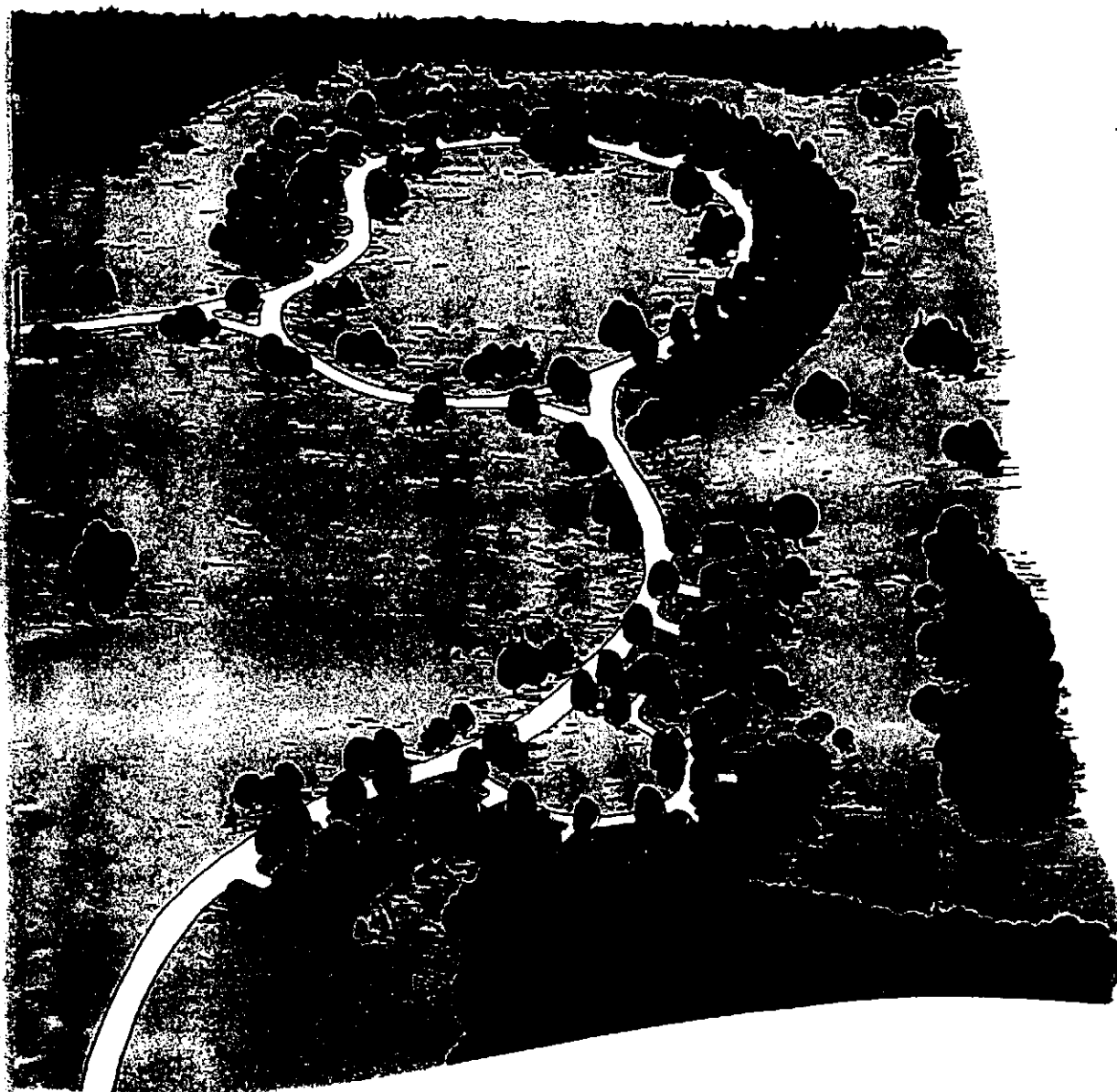
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LAND PRESERVATION

Old Challenge . . .
New Ideas

Montgomery County, Pennsylvania

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P.O. Box 311, Norristown, PA 19404-0311



~ MONTGOMERY COUNTY, PENNSYLVANIA ~

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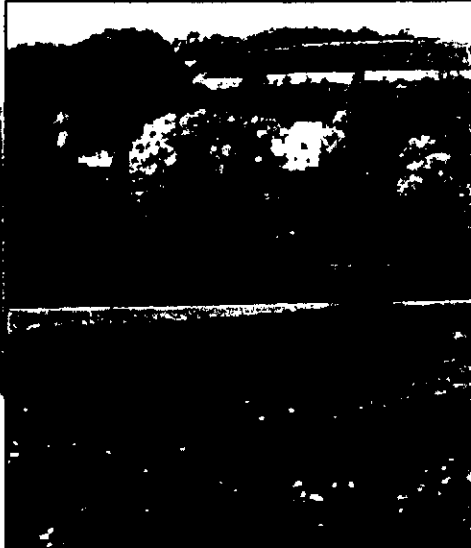
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Dilemma . . .



How to allow residential development in rural areas without destroying rural character.

In recent years residents have shown a concern with the deterioration of the quality of life that standard suburban development patterns bring.

Important issues include the degradation of environmentally sensitive areas,



destruction of farmland, loss of rural character, and loss of rural life.

To address these concerns, the Montgomery County Planning Commission (MCPC) has created the LAND PRESERVATION DISTRICT (LPD) as an alternative to standard residential lotting.

The Land Preservation

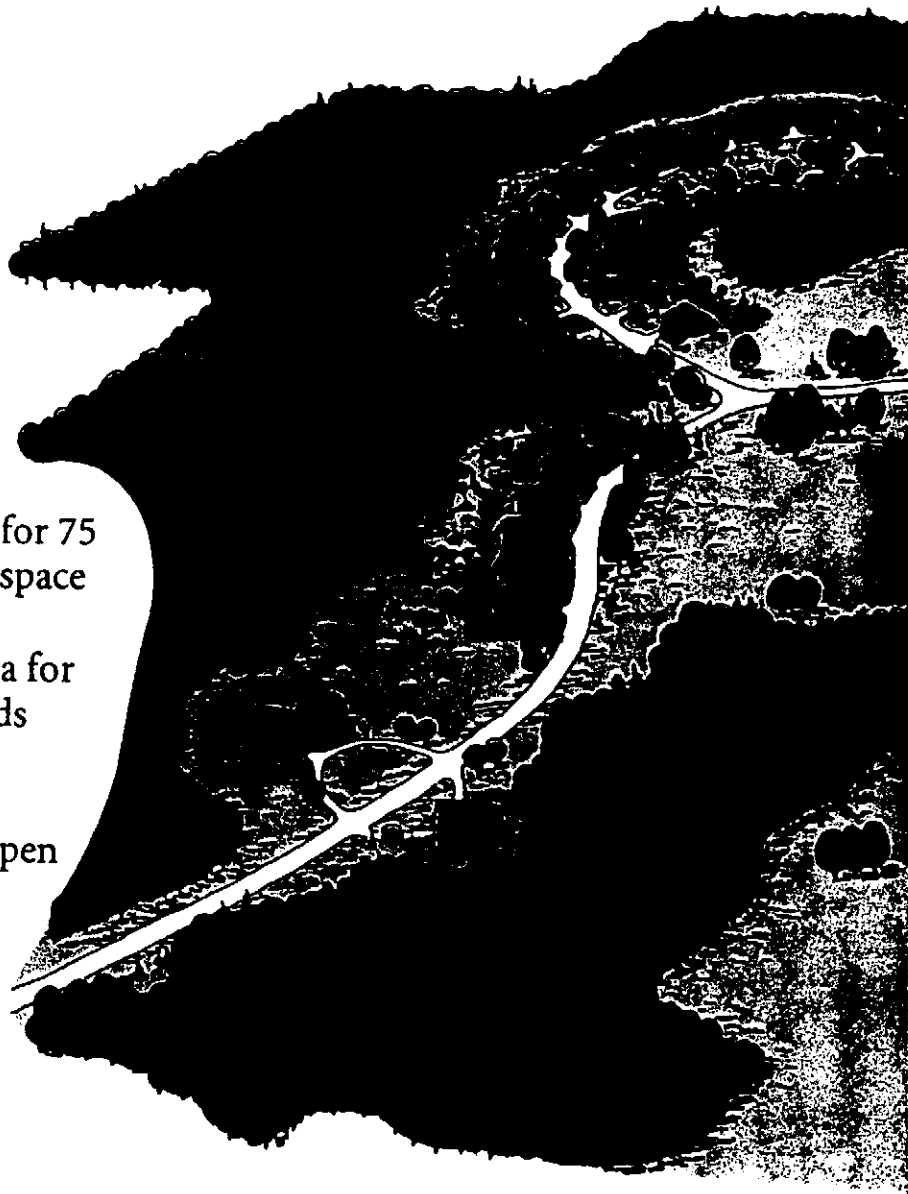
The purpose of the LPD is to permit a reasonable amount of residential development while preserving open space, sensitive natural areas, and rural community

character that would be lost under conventional development. This is done by locating the homes in small, compact neighborhoods in an open space setting,

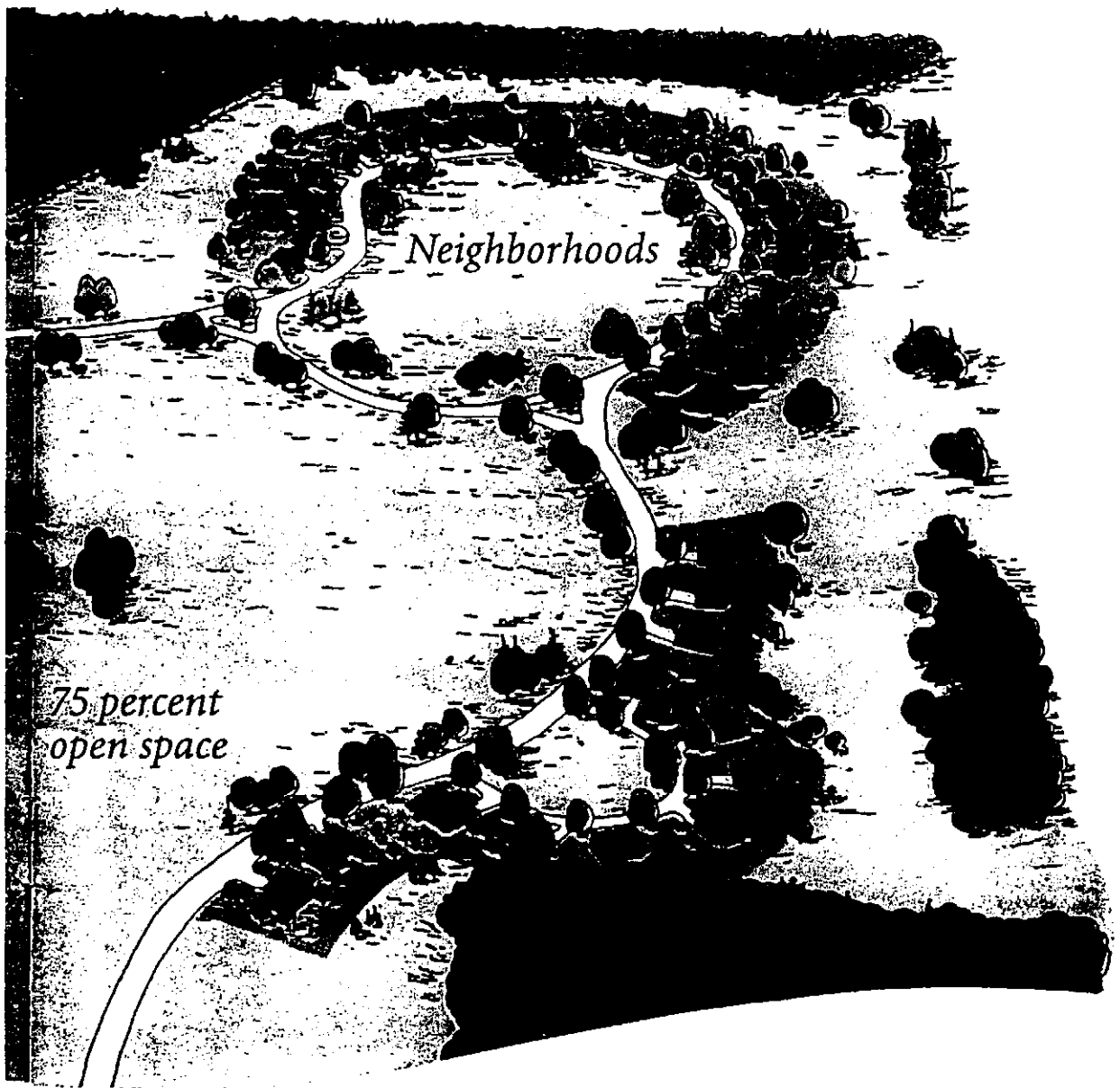
designed to reduce the perceived intensity of the development, to provide privacy and neighborhood identity, and to preserve natural features or farmland.

Key features of the LPD include:

- ☞ Requirement for 75 percent open space
- ☞ Design criteria for neighborhoods
- ☞ Emphasis on community open space goals



District . . .



Smaller lot size

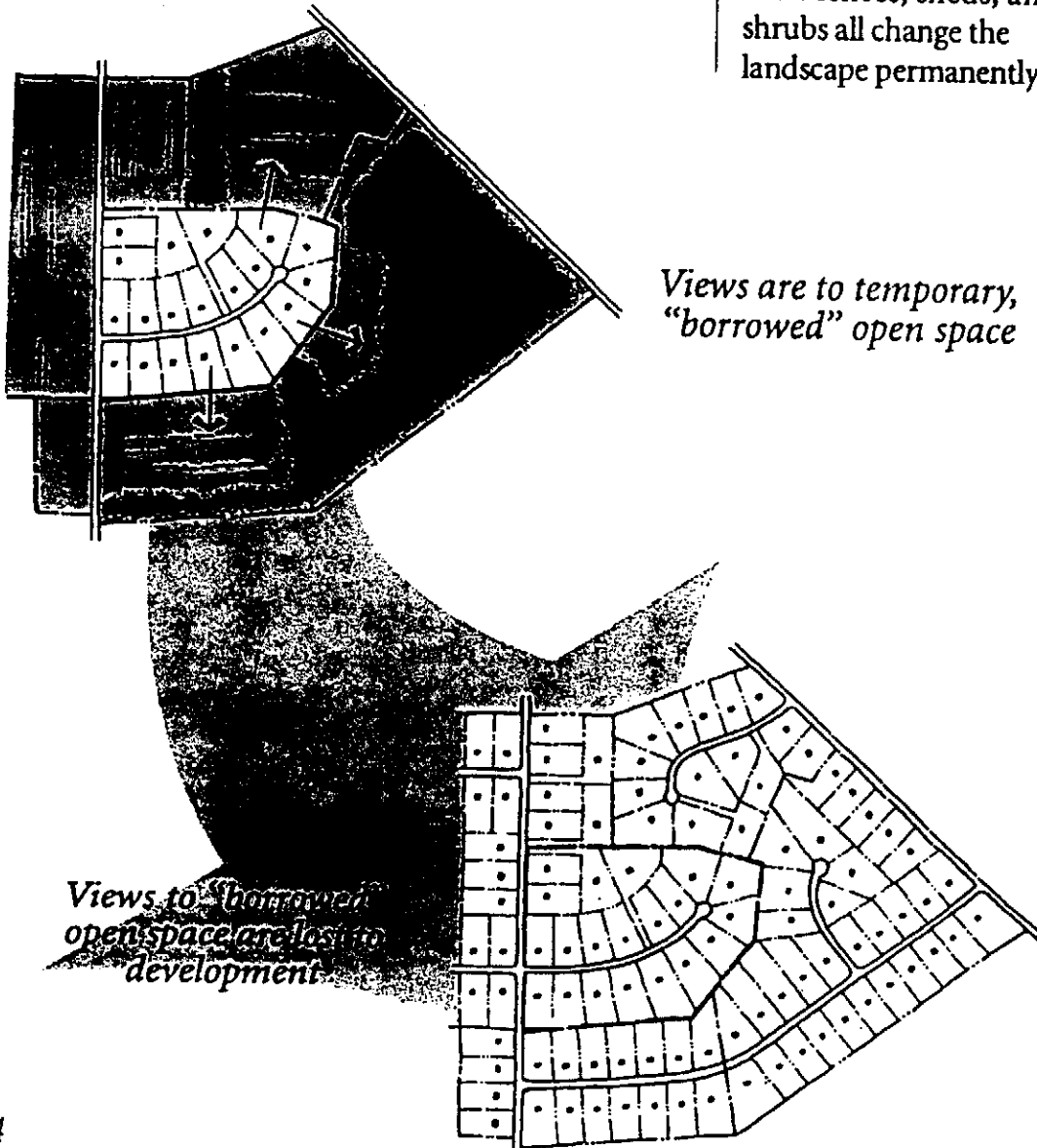
What happens to our rural open space

The typical one- to two-acre lot in a conventional zoning district will seem "rural" only as long as it borders farm fields

or woods of neighboring properties. However, this is "borrowed" open space, temporary in nature. When those abutting

properties are also developed for home sites, the surroundings will be suburban in character, and the feeling of "living in the country" will be lost. The view of houses, driveways, and large private yards with their fences, sheds, and shrubs all change the landscape permanently.

Two-Acre Zoning



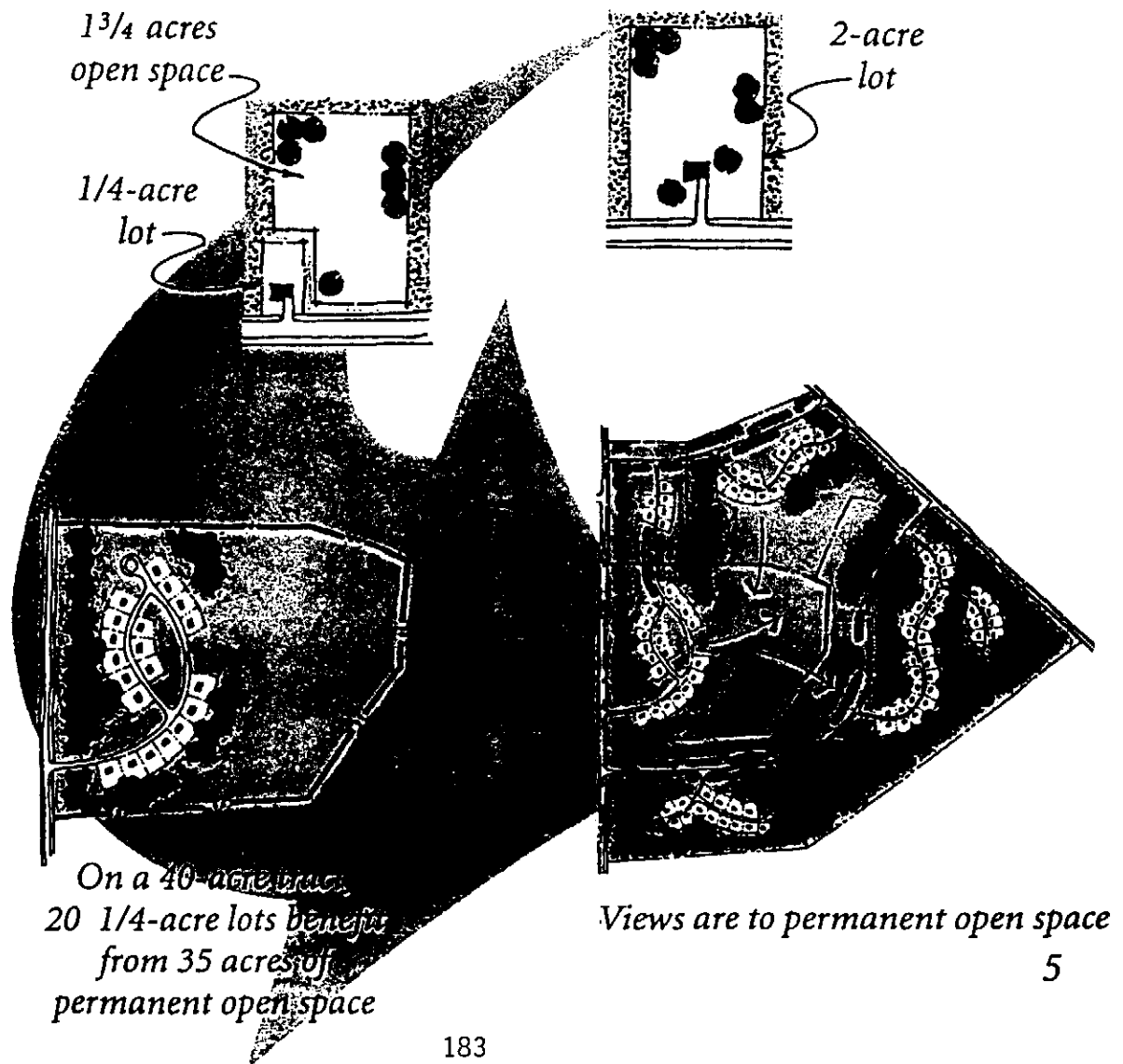
Permanent open space can be created through the concept of lot size reduction . . .

In the LPD the concept of lot size reduction is used to create permanent open space. For example, if under the regulations of a standard residential district, one dwelling is allowed on a two-acre

lot, in the LPD this dwelling would be restricted to a quarter-acre lot and the remaining one-and three-quarter acres would become permanent open space. Thus, on a 40-acre

tract, 20 units would be allowed on 20 quarter-acre lots (occupying a total of five acres), and the remaining 35 acres would become permanent open space to be enjoyed by all residents.

LPD Development



Hasn't this concept been used before?

Many municipalities use the concept of lot size reduction in so-called "cluster" districts in their zoning ordinances. Yet, development in many of these districts looks and feels much like conventional suburban development.

These developments have reduced lot sizes, but not enough open space to have a noticeable impact (usually 25 percent or less). The view from the road is of houses and driveways, and most of the open space is often hidden on "leftover," unusable land.

Furthermore, while these "cluster" districts may succeed in protecting some sensitive natural areas, they contain inadequate design standards governing how the development and the open space should be laid out.

The LPD provides:

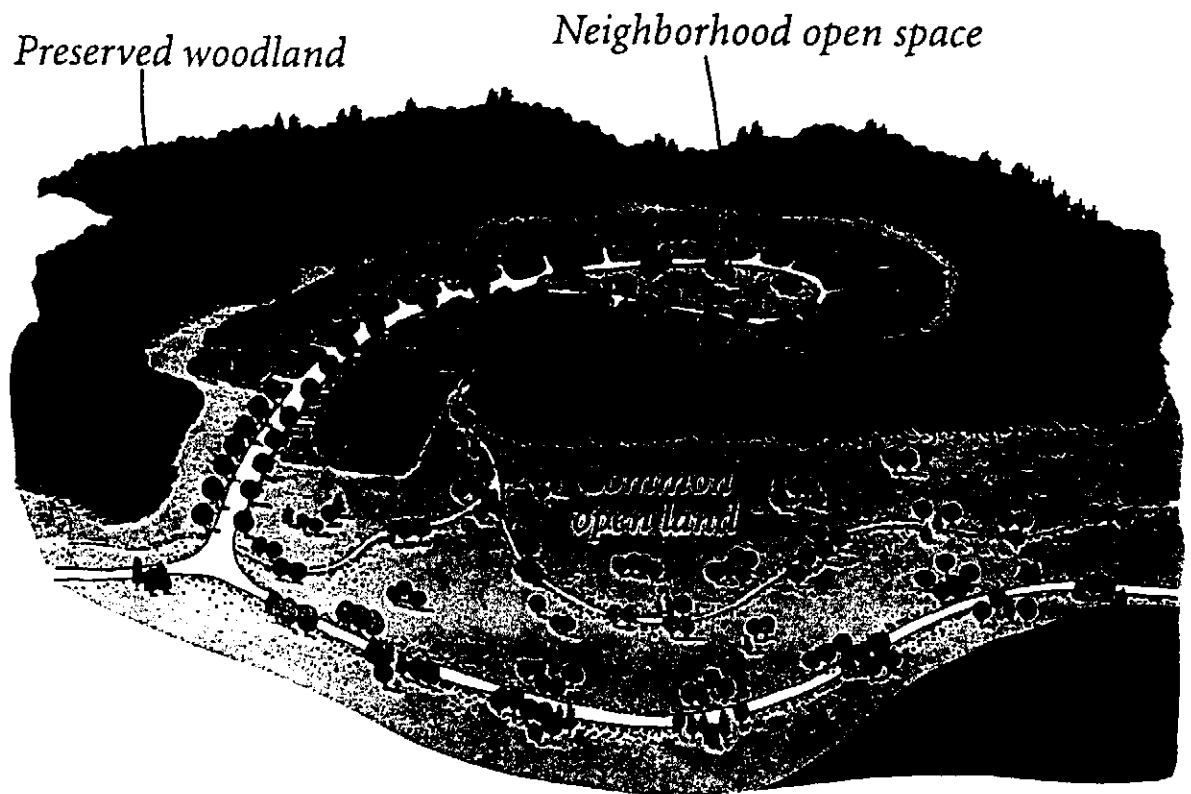
- ~ 75 percent open space located for maximum visibility



- ~ Design criteria for neighborhoods



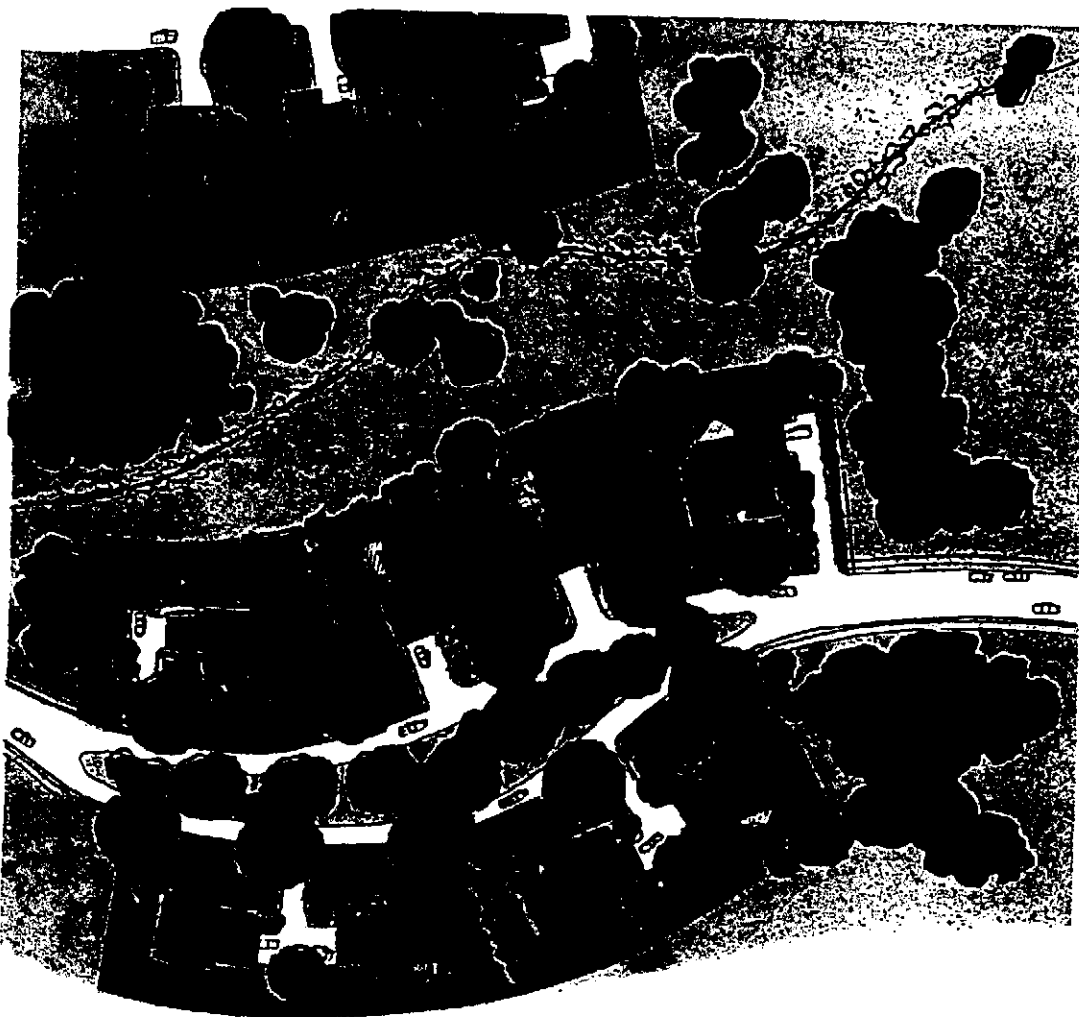
Quality of life through design criteria . . .



- ∞ A minimum of 75 percent open space is required.
- ∞ Typical lot size is 10,000 square feet, but this can be reduced to 6,000 square feet.
- ∞ Neighborhoods must contain at least five, but no more than 25 dwellings.
- ∞ Open space within the neighborhood is required for groups of ten or more dwellings.
- ∞ Setbacks are required between neighborhoods and from certain site elements such as roads, croplands, and floodplains.

Neighborhood quality . . .

An LPD neighborhood should be designed as a unified whole in which all the elements work well together. Because the neighborhoods are compact, their scale is smaller and more intimate than the typical suburb, yet they still accommodate the automobile and give residents privacy. The municipal zoning ordinance deals with the placement of homes, dimensions of yards, and relationships to open space. The municipal subdivision and land development ordinance should contain standards for streetscape elements -- street widths, sidewalks, curbs, street trees, driveways, and parking spaces -- that are suited to the special characteristics of the LPD.



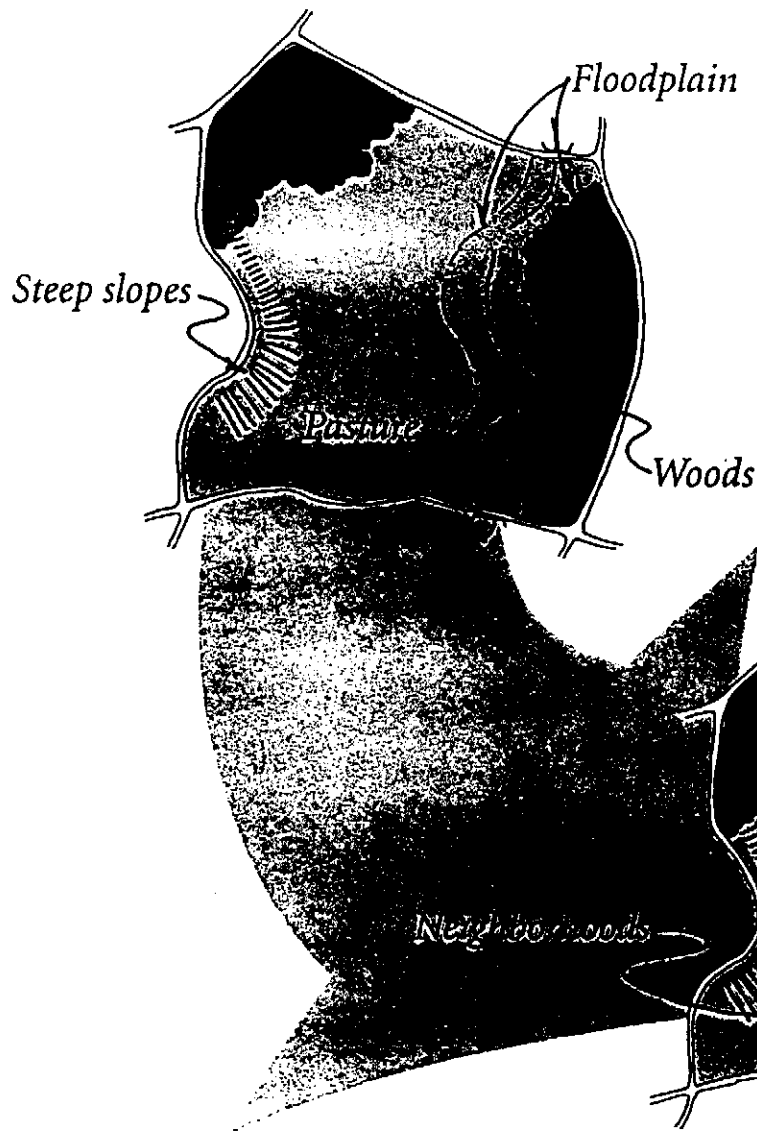
Community goals for open space can be met.

The best method for establishing community goals is through the community's comprehensive plan or

open space plan. A community can set its own goals as to which features should be protected.

A site analysis on a particular tract will determine its natural features and, combined with comprehensive planning goals, will lead to appropriate locations for dwelling units and open space.

Site Analysis



Concept Plan

The LPD provides the design flexibility needed to locate uses on a site where they can best meet the chosen community goals.

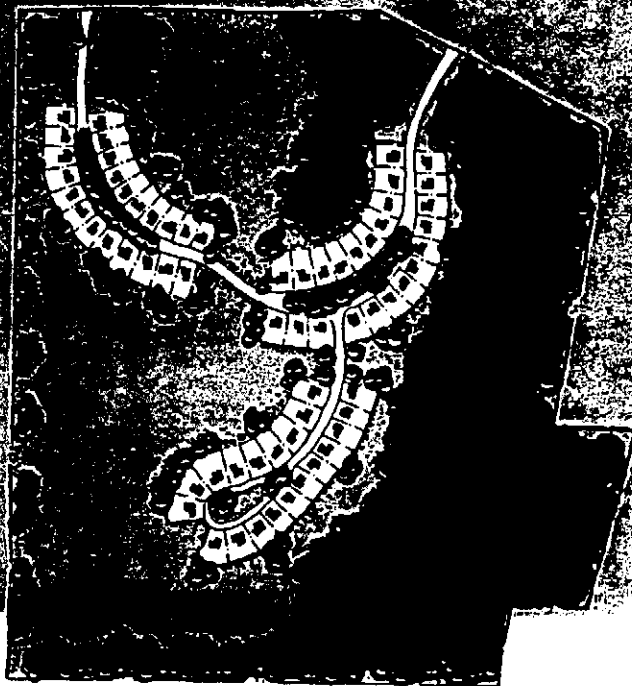
On a particular site any one
can be reached . . .

. . . for example

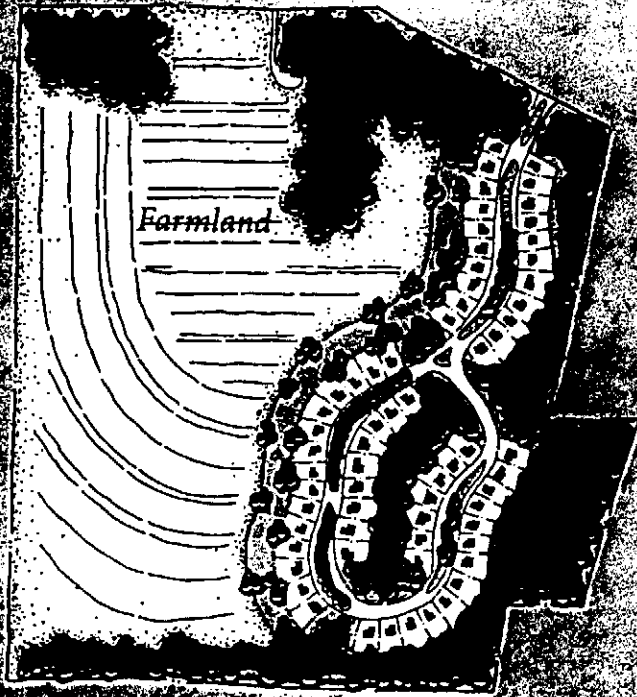
Goal A

**Woodland
Preservation**

Homes are located
in the open fields,
saving the woodland



of several community goals

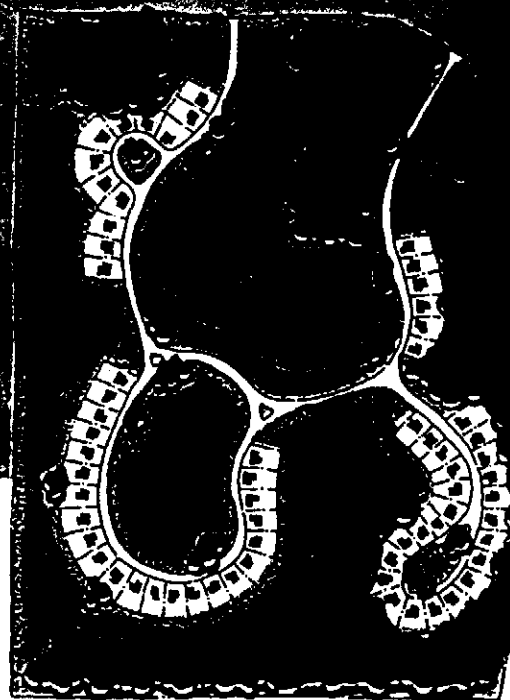


Goal B Farmland Preservation

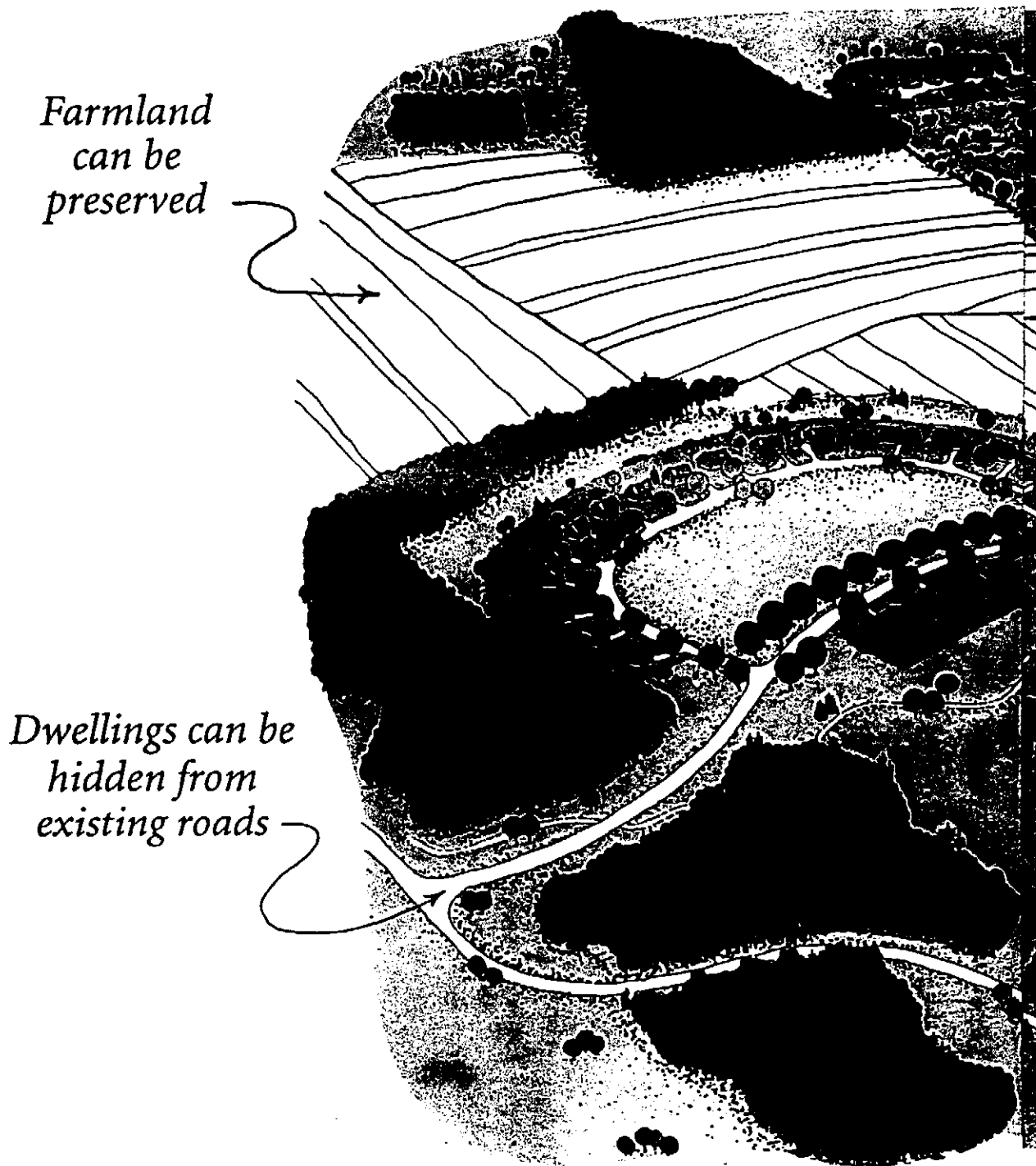
Fields suitable for farming
are not built upon; homes
are located in the woodland

Goal C Preservation of Scenic Views

Homes are located on the
slopes below the ridge lines,
preserving long-distance
views over the rooftops



Abutting LPD development community benefits . . .



ents will provide greater



*The municipal
open space network
can be enlarged*

*Rural vistas
can be preserved*

How will the open space

Many alternatives exist for the ownership and management of the open space: it can be left in its natural state, farmed, or used in whole or in part for park and recreation purposes.

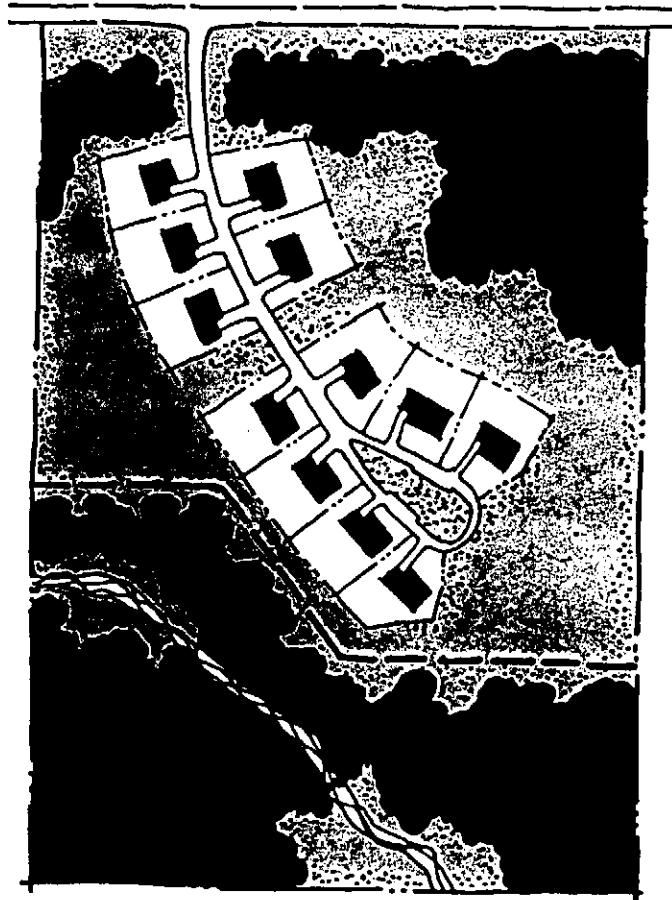
No matter which management option is used, the open space is restricted by permanent easement from any further development.

Homeowners Association

A homeowners association (HOA) can be formed to own and manage the open space. The association can use the land in many ways, as determined by the residents, and may lease all or part of it for agriculture. The open space need not be accessible to the general public.

Municipal Ownership

Another option is for the municipality to take title to all or part of the open space; this area could be developed as part of a larger municipal open space and park plan. In this case, the land would be accessible to the general public.



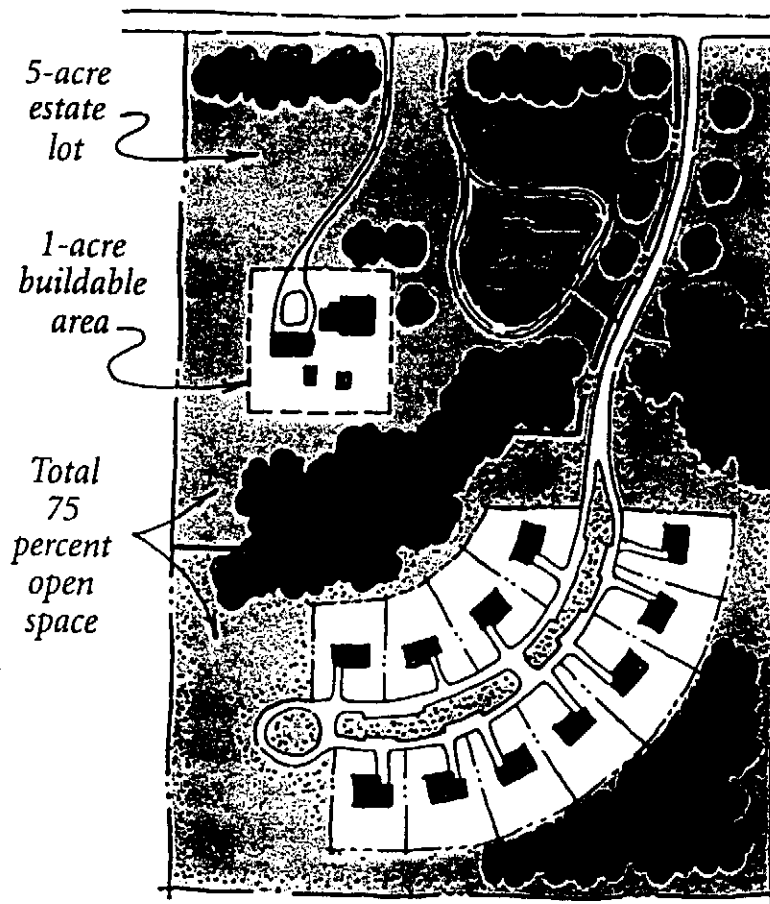
Private Conservation Group

A private, nonprofit conservation group (such as a watershed association, land trust, or conservancy) may also hold title to the open space and manage it to achieve conservation goals. Public access may or may not be permitted.

How managed?

Estate Lots

A unique feature of the LPD is a provision that allows open space to be held on "estate lots" -- large, private lots with a minimum size of 5 to 15 acres, depending on the size of the original tract. As with open space owned by the municipality, a conservation group, or an HOA, the open space is restricted by permanent easement from any further development.



Neighborhood lots

- ∞ Dwellings on estate lots are counted toward the maximum density permitted on the tract.
- ∞ No more than one acre of the estate lot may be used for a home site and accessory buildings. The remainder of the lot may be used for agriculture or left in its natural state.
- ∞ Public access to estate lots may be permitted through trail easements or other agreements, but is not required.

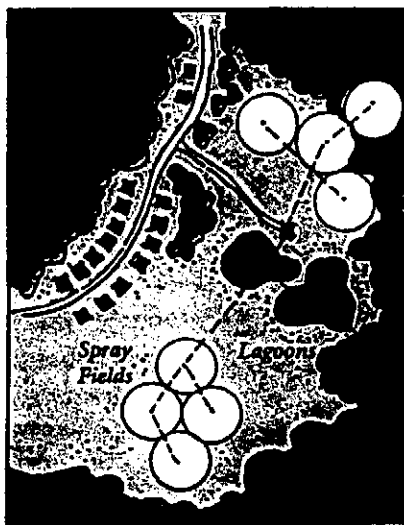
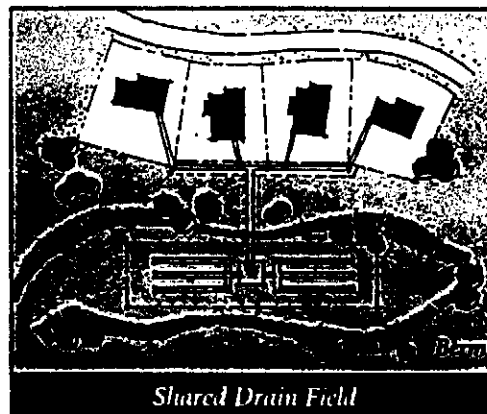
What about sewage treatm

Most LPD developments will be located in rural areas, away from public sewage treatment facilities. There are numerous other alternatives for handling the collection, treatment, and disposal of sewage. Many of these alternatives involve the use of a portion of the open space, as depicted below. The parts of the system that would be located on individual lots would be maintained by the individual homeowner, while components that are shared would be the responsibility of the homeowners association or the municipality.



Subsurface Disposal ...

In a community system, either individual or community tanks could be used. Disposal is accomplished through the use of community drain fields or sand mounds, which can be incorporated in a landscaped berm located in the common open space.

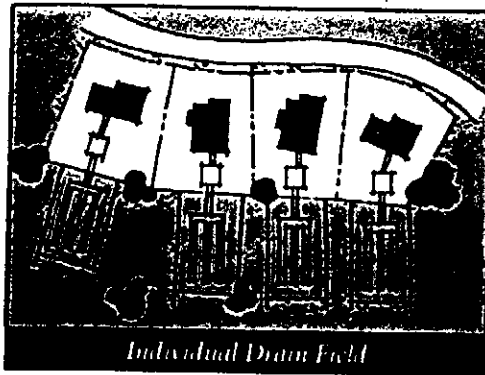


The Spray System ...

Another alternative is a centralized lagoon system consisting primarily of several ponds equipped with aerators to facilitate biological treatment and prevent odors. The ponds can easily be integrated into the landscaping scheme of the project. The treated effluent would be sprayed in fields or woodlands in the common open space.

ment?

Individual Systems



The system most commonly used in conventional, large-lot development is the individual septic tank or aerobic tank with a subsurface drain field or sand mound located on each lot. In the LPD, individual septic or aerobic tanks could also be located on the lot. The drain field or sand mound, however, would be located in the common open space.

How does the LPD fit into a typical zoning ordinance?

The LPD would not replace all other residential zoning districts; rather, it would work in conjunction with them. The LPD can either be applied as a mapped district or as an overlay district to those areas of the municipality where open space, rural character, and environmental resources are considered important. Generally, such

areas are already zoned for one- or two-acre lots. The LPD simply uses this density in a different manner.

If the LPD is applied as a mapped district, it would replace one or more selected existing zoning districts on the zoning map. If the LPD is applied as an overlay district, its requirements would apply to any tract within the underlying

district that meets certain criteria. For example, the LPD might apply to all parcels of at least ten acres.

Whether the LPD is applied as a mapped or an overlay district, we recommend that its provisions be mandatory, to ensure that the municipality's open space and environmental goals are met.

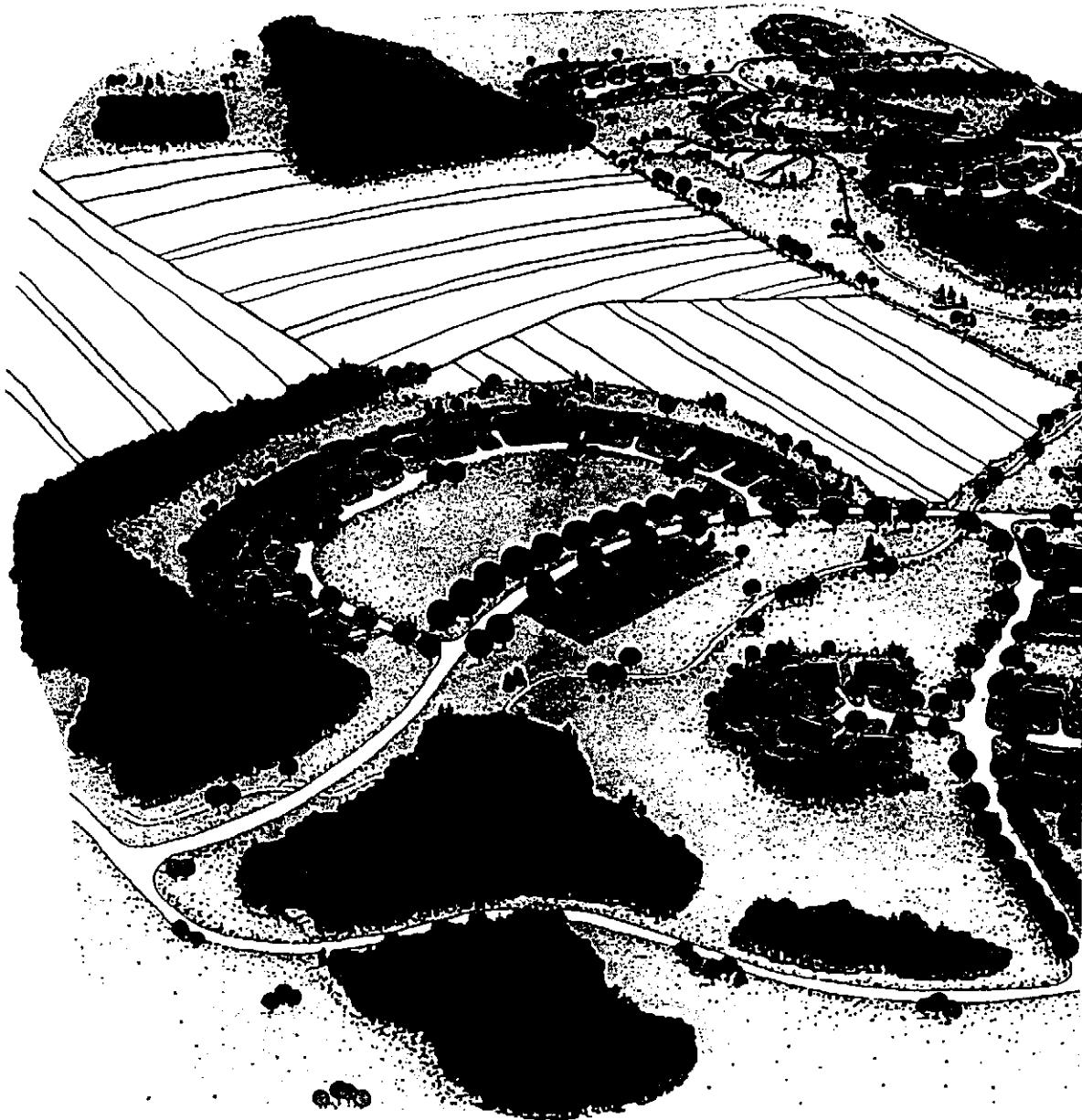
Why choose the LPD?

∞ Community Goals

Comprehensive planning goals for open space location and design can be met.

∞ Flexibility

The LPD creates the flexibility to site the homes in a way that best preserves woods, farms, and rural views.

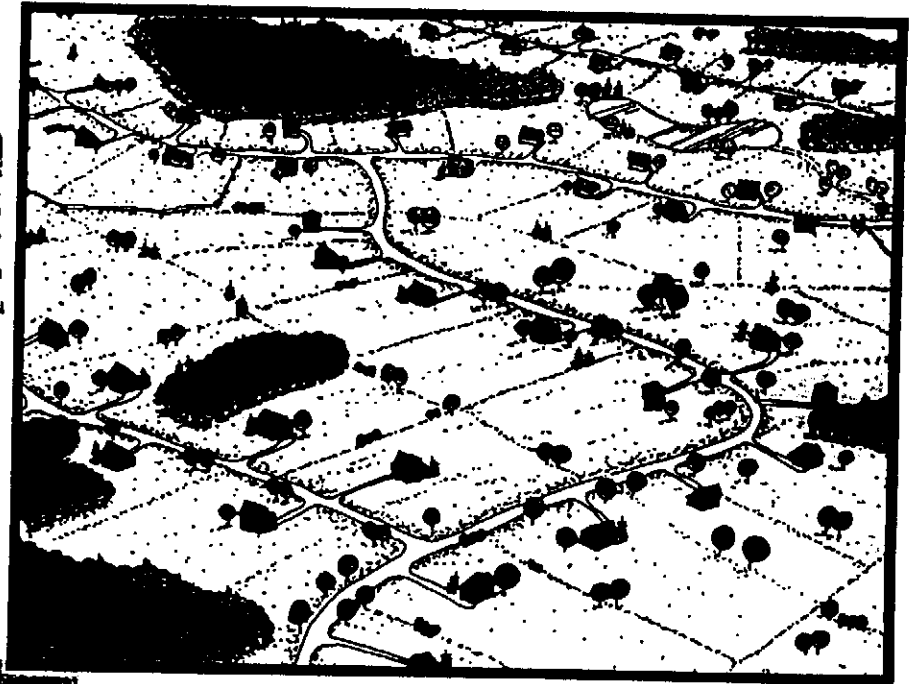


∞ Design

Design requirements
guide development
toward desired results.

∞ Open Space

At 75 percent of the tract,
enough open space is
created to have a definite
positive impact.



By Comparison . . .

- . . . No open space*
- . . . Rigid lotting*
- . . . No design guidelines*
- . . . Community goals are not
identified or achieved*
- . . . Rural character is lost*

Growth Management in

If there are any two singular words that can best describe what has been happening in Montgomery County and much of southeastern Pennsylvania during the past few decades, they would have to be "growth" and "change." Since 1950 our county has seen a rate and amount of growth and change that is unprecedented in its history.

Our population has almost doubled during the past four decades, from about 353,000 in 1950 to about 678,000 today. The number of housing units has increased 175 percent during that same time period to almost 266,000 today. According to the 1990 census, we added over 33,000 units during the 1980s.

There has also been a rapid growth of business and industry, which is just as important in terms of its impact on the physical and economic landscape of the county. In 1950 the number of jobs located in Montgomery County represented 9 percent of all the jobs in the Philadelphia region. By 1987 the number of jobs in the county grew to a total of over 493,000, which was 20 percent of all the jobs in the region.

The impact of this continuing growth is phenomenal. We estimate that over 17,000 acres (approximately 27 square miles or 6 percent of the county's land area) were developed during the last ten years alone!

In 1990 the Montgomery County Planning Commission embarked on a program to develop growth management tools to address this rapid and often uncontrolled development. The Land Preservation District (LPD) is the first such tool.

The LPD is a zoning district that addresses residential growth only. It restricts neither the amount (i.e., density) nor the timing of growth. It does regulate the physical location of growth by guiding the location of houses on a tract, thus strongly influencing the visual perception of density. It will enable communities to protect valuable natural resources, preserve open land

Montgomery County

and rural character, and provide for the recreational needs of residents to a degree that is virtually impossible under conventional suburban zoning. It is limited to single-family, detached housing -- the predominant housing type in

Montgomery County.

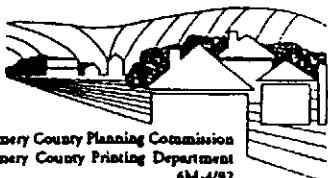
In the upcoming years this commission will continue to develop new model ordinances and development guidelines that will address some of the many problems of unmanaged growth. Current efforts are

concentrated on village planning and the concept of using transfer of development rights to promote growth where it is wanted, while preserving open land where needed. ~

For additional information on the Land Preservation District, the following reports are available from:

Montgomery County Planning Commission
Courthouse, Norristown, Pennsylvania 19404
phone (215) 273-3722

- ~ Land Preservation District Model Zoning Provisions
- ~ Land Preservation District Land Development Standards
- ~ Guidelines for Successful Homeowners Associations
- ~ Guidelines for Open Space Management in the LPD
- ~ Sewage Treatment Alternatives for the LPD



Prepared by the Montgomery County Planning Commission
Printed by the Montgomery County Printing Department
MCPC 76.30-92 6M-4/92

Pilot Conservation Development Evaluation System

As public pressure on developers mounts to create more "environmentally friendly" developments, a tool is needed to encourage developers and communities to change development designs and to evaluate their effectiveness. The Conservation Development Evaluation System (CeDES) is a rating system created to evaluate a conservation development over the development's lifetime with an emphasis on the water quality and landscape impacts of the development. The purpose is to get developers to think about environmental concerns earlier in the planning process.

CeDES looks at "conservation development" in the context of four specific areas: site design and construction practices, stormwater management, preservation of open space, and protection of natural resources. It does not address issues which are important to make development more sustainable overall, although CeDES strongly supports this objective. For example, although they are not the focus of this evaluation system, the groups that developed CeDES favors infill and brownfield development, mixed-use, pedestrian-centered, or transportation efficient designs, as well as protection of cultural and scenic landscapes and rural character. The CeDES system is not intended to achieve these broader goals, but it does not preclude and can even help to advance them.

CeDES was developed by The Conservation Fund in cooperation with members of the Conservation Development Alliance (see description below) and with input from many professionals skilled in planning and evaluating conservation developments. The Conservation Development Alliance currently is being formed as part of this effort and to assist in regional workshops on conservation development. Potential partners include representatives from local, state, and federal government, national associations (e.g., National Association of Home Builders, Urban Land Institute), professional associations (e.g., American Society of Civil Engineers, American Planning Association), environmental groups, land owners, research institutions (e.g., The Center for Watershed Protection), and others.

CeDES is intended to provide a starting point and a tool that communities, developers, conservationists and consumers can use in evaluating "conservation" claims in terms of watershed and habitat protection. It is designed to provide a general evaluation system and should be customized for specific areas based on topography, soils, vegetation types, and sensitive natural areas that are a priority to protect. Ideally, each criterion will be related to an accepted industry standard that also provides for differences in landscape setting, soils, vegetation, etc. The system is designed to be comprehensive in scope, yet simple in operation. Some important criteria are too site-specific to set general standards, such as vegetated buffers to protect surface waters and other sensitive features from impacts of development. Developers should be expected to design these important elements into their projects (e.g., minimum 50-ft. buffers along streams, lakes, and wetlands). CeDES is intended primarily for areas of the eastern and Midwestern U.S. not the arid West, where water resource and land cover issues may differ substantially.

The CeDES evaluation will be maintained and updated by the Conservation Development Alliance. Ideally, local professionals such as Soil Conservation staff will be brought in to provide an independent review of projects using CeDES.

This system is designed for rating new and existing developments. It is a feature-oriented system where points are awarded or deducted for satisfying a specified criterion. CeDES recognizes that in communities with already restrictive development standards some developments may not score as well. Further, the CeDES ratings are much more stringent than the norm for many typical developments. Therefore, even a "1-Leaf" rating should be considered the mark of a good conservation-oriented development. CeDES intent is to encourage developers to strive to meet these rigorous standards and achieve multiple "leaf" ratings for their developments.

RATING SYSTEM CRITERIA

Eligibility

All residential and commercial developments greater than 10 acres (sewered) and 20 acres (unsewered) are recommended for evaluation as a Conservation Development using CeDES.





Compliance Criteria

For classification as a Conservation Development, applicants must satisfy all of the prerequisites and earn a certain number of points to attain specified Conservation Development classifications. Having satisfied the basic prerequisites of the program, the applicant development is then rated according to the scoring system listed below.

Scoring

CeDES' scoring system is based on the premise that developments always should meet certain basic standards. *Positive* points will be awarded to developments that employ practices that go beyond basic standards to minimize impacts on water quality and natural resources. *Negative* points will be assessed for aspects of developments that do not meet basic standards. Examples of negative practices include encroachments into wetlands or 100-year floodplains with fill or structures, and regrading or developing on steep slopes (e.g., >10%, depending on soil erodability).

A total of 20 points are available under the Conservation Development Evaluation System with four categories of certification:

-  - Conservation Development for developments that earn (50%) 10 or more of the available points.
-  Conservation Development for developments that earn (40-49%) 8-9 of the available points.
-  Conservation Development for developments that earn (30%-39%) 6-7 of the available points.
-  Conservation Development for developments that earn (20-29%) 4-5 of the available points.

The Conservation Fund's Conservation Development Evaluation System (CeDES)

I. Overview of the System

- Presents a method of evaluating Conservation Developments.
- Recognizes the site-specificity of each development and limitations on planning and design.
- Relies on the development of a baseline ("0" score) to which to compare the proposed development.
- Assumes that most developments being evaluated were somewhat disturbed or managed landscapes before development (e.g., agricultural land).
- Is not intended for undisturbed land or high-quality natural areas that require more rigorous protections.
- Understands that each category may not apply to every development.
- Emphasizes impact on water quality.

II. Prerequisites

Evidence that the site design process includes a review and analysis of the site's sensitive natural features and that the site plan reflects that review. One approach to this process is outlined in the Natural Lands Trust's "Growing Greener" approach (see attached).

III. Core Criteria

Each development will be judged on the following core criteria. Please circle the appropriate response. Use the comment section after each criterion to elaborate on your response, as appropriate. If a criterion does not apply, explain why.

1. SITE DESIGN AND CONSTRUCTION PRACTICES

1a. Percent Impervious Surfaces Relative to Conventional Development

Rationale - The greater the impervious surface percentage, the greater the amount and level of contamination of runoff and the lower the infiltration for natural replenishment of groundwater. This criterion also will be an indicator for the decrease in nutrient loadings, which have been proven to correlate well with percent impervious surfaces.

Measurement - The percent decrease in street, sidewalk, and driveway surfaces compared to a conventional design for the site (e.g., based on local zoning requirements or national averages for conventional design: streets >22 ft. widths; cul-de-sacs > 40 ft. radius; sidewalks > 4 ft. width; driveways unshared between homes, and > 9 ft. one-lane or > 18 ft. two-lanes)

- 2. No decrease
- 0. 15% decrease
- +1. 35% decrease
- +2. 60% decrease
- X Does not apply

Comments on site-specific constraints: _____

1b. Preservation of Natural Features/Land Form Change

Rationale – Generally, the less disturbance there is, the lower the impact of the project on water quality and natural resources. This criterion is intended to measure the disturbance of the land during construction and encourages road and lot design to fit with the existing topography.

Measurement – Relative levels of cutting and filling (It is understood that there may be sites where dredging a silted-in area would be beneficial).

- 2. Mass disturbance/grading, more than 80% of parcel being developed
- 1. Significant/large contiguous areas of grading, 50-80% of parcel being developed
- 0. Minimum cut and fill, no large areas of grading
- +1. Grading less than 30% of parcel being developed; cut and fill depth and area minimized around structures or streets
- +2. Design and implementation of grading/cut & fill activities create minimum disturbance of natural land forms and least possible disturbance and compaction of soils
- X Does not apply

Comments on site-specific constraints: _____

1c. Sediment and Erosion Control

Rationale - Minimizing erosion and other sediment transport during and immediately after construction minimizes a major source of damage to water quality and watershed's ecological health.

Measurement - Relative use of sediment and erosion controls using strong local or region-specific soil erosion control manuals. (Note: Professionals with the National Resource Conservation Service (NRCS) or other local soil experts should be consulted to ensure that local regulations are strict enough to achieve the intent of the standards below, otherwise fewer points should be given for meeting less-stringent local control ordinances.)

- 2. No controls
- 1. Required construction erosion controls in place but failing
- 0. Required construction controls in place, monitored, and in compliance
- +1. Required construction controls exceeded
- +2. No measurable soil loss

X Does not apply

Comments on site-specific constraints: _____

2. STORMWATER MANAGEMENT

2a. Runoff Rate

Rationale - Reducing the velocity of runoff from a development site, by retaining more on-site and allowing it to infiltrate, allows more runoff to infiltrate, and reduces erosion. Reduction in runoff *rate* may be attained by many methods including grass swales, buffers, reduction of impervious surfaces, etc..

Measurement - Rate of runoff as compared to immediately prior pre-development land-use conditions for the 10-year design storm using locally approved stormwater runoff models (e.g. TR-55).

- 2. >15% increase in runoff rate
- 1. 0-15% increase in runoff rate
- 0. No increase in rate of runoff
- +1. 0-10% decrease in runoff rate
- +2. >10% decrease in runoff rate
- X Does not apply

Comments on site-specific constraints: _____

2b. Runoff Volume

Rationale - Reducing the total volume of runoff from a development site, by retaining more on-site and allowing it to infiltrate, reduces erosion, sedimentation, and other impacts on surrounding bodies of water. Reduction in runoff *volume* may be attained by many methods including grass swales, buffers, reduction of impervious surfaces, on-site detention, infiltration basins, etc..

Measurement - Volume of runoff as compared to immediately prior pre-development land-use conditions for the 2-year design storm using locally approved stormwater runoff models (e.g. TR 55).

- 2. >15% increase in runoff volume
- 1. 6-15% increase in runoff volume

- 0 0-5% increase volume of runoff
+1. No increase in runoff volume
+2. Decrease in runoff volume
X Does not apply

Comments on site-specific constraints: _____

3. OPEN SPACE

3a. Management of Open Space

Rationale - Generally, the more contiguous open space that is preserved in a natural state, the lower the project's impact on the ecosystem.

Measurement - Ratio of open space adjusted for vegetation and management to total open space.

Adjusted Open Space Ratio					
	Density in units/ac				
Points	<u>>4</u>	<u>>2-4</u>	<u>>1-2</u>	<u>0.5-1</u>	<u><0.5</u>
-2.	0-9%	<15%	15-24%	25-34%	>40%
-1.	10-14%	15-24%	25-34%	35-49%	>50%
0.	15-24%	25-34%	35-49%	50-59%	>60%
+1.	25-30%	35-40%	50-55%	60-70%	>70%
+2.	>30%	>40%	>55%	>70%	>80%
X	Does not apply				

Open space calculated as follows:

$$\frac{(A \times 0.2) + (B \times 0.2) + (C \times 0.5) + (D \times 1.0)}{E} \times 100 = \text{Adjusted open space ratio}$$

Where:

A = Acres of open space with managed landscape

B = Acres of open space in agriculture with annual crops

C = Acres of open space in agriculture with perennial crops

D = Acres of open space with native habitat

E = Total undeveloped acres of open space

Example Development:

Total Site Acreage	50 acres
Buildable Acreage	40 acres
Built	15 acres (40 homes)
Remaining buildable acreage	25 acres (12 acres turf grass and 13 acres restored native habitat)
Unbuildable acreage	10 acres (floodplain, wetland, steep slopes)

A = Managed landscape	12 acres (turf grass and non-native ornamentals)
B = Agriculture with annual crops	0 acres
C = Agriculture with perennial crops	0 acres
D = Native habitat	23 acres (10 unbuildable and 13 restored)
E = Total undeveloped acreage	35 acres (10 unbuildable and 25 buildable)

$$\frac{(12 \times 0.2) + (0 \times 0.2) + (0 \times 0.5) + (23 \times 1.0)}{35} \times 100 = 72.6\%$$

Based on the project's 0.8-unit density per acre (40 homes ÷ 50 acres), the adjusted open space ratio would earn a ranking of +2 using the table above.

Comments on site-specific constraints: _____

3b. Environmentally Constrained Open Space

Rationale – There should be no building, grading or clearing in certain sensitive areas including wetlands, floodplain, and steep slopes. A development that adequately protects such areas through easements and by designation as protected, undivided open space could receive a high score under this criterion. This criterion recognizes development that provides long-term protection of these sensitive areas through easements and other development restrictions.

Measurement - relative percentages of environmentally constrained open space preserved, adjusted for degree of protection.

- 2. < 50%
- 1. 51 – 70%
- 0. 71 - 80%
- +1. 81 – 90%,
- +2. 91 – 100%
- X Does not apply

Open space calculated as follows:

$$\frac{(A \times 0.5) + (B \times 1.0)}{C} \times 100 = \text{Adjusted environmentally-constrained open space}$$

Where:

A = Acres of environmentally-constrained open space undivided into lots (i.e. common open space)

B = Acres of open space with permanent protection (e.g., conservation easement)

C = Total acres of open space

Example Development:

Given: The development has 5 acres of wetlands protected under a conservation easement, 3 acres with > 25% slope, and 2 acres of floodplain, for a total of 10 acres of environmentally constrained open space. All the wetlands and steep slopes are undeveloped but half of the floodplain is developed.

Environmentally Constrained Resource	Open Space (acres)	Open Space with Permanent Protection (acres)	Developed (acres)	Total
Wetlands	0	5	0	5
Floodplain	1	0	1	2
Steep slopes	3	0	0	3
Other	0	0	0	0
Total	4	5	1	10
Variable	A	B		C

$$\frac{(4 \times 0.5) + (5 \times 1.0)}{10} \times 100 = 70\%$$

The adjusted rating would be -1 because the steep slope areas were not protected by permanent conservation easements and floodplain was partially developed.

Comments on site-specific constraints: _____

4. PROTECTION OF NATURAL RESOURCES

4a. Development of Natural Resources Protection Plan

Rationale – A site's entire set of resources needs to be considered holistically and protected in an integrated manner.

Measurement – Degree of natural resource-based site planning and long-term protection

- 2. No natural resource inventory or management/protection plan
- 1. Natural resource inventory conducted, but no significant linkage to site design
- 0. Natural resource inventory conducted, natural areas linked into continuous open space system
- +1. Natural resource inventory conducted, natural areas linked, permanent protection of natural areas/open spaces (e.g., easements)
- +2. Natural resource inventory conducted, natural areas linked, permanent protection of natural areas and adjacent open spaces (e.g., conservation easement), management/protection plan in place, long-term management/protection plan in place
- X Does not apply

Comments on site-specific constraints: _____

4b. Existing Vegetation: Tree and Native Plant Conservation

Rationale - Generally, if mature trees or other native plants, such as prairie plants, are present on the site, preserving those plants lowers the impact of the project on local ecosystems.

Measurement - Loss of mature trees or other native plants

Pts.	Pre-Development Tree/Native Plant Cover on Site			
	10-35%	35-50%	50-75%	75-100%
-2.	loss >10%	loss >30%	loss >50%	loss >70%
-1.	loss 0-10%	loss 20-30%	loss 30-50%	loss 60-70%
0.	no net loss	loss 0-20%	loss 10-30%	loss 50-60%
+1.	no absol. loss	no net loss	loss 0-10%	loss 40-50%
+2.	no absol.loss & add'l. planting	no absol.loss	no net loss	loss <40%
X	Does not apply			

Comments on site-specific constraints: _____

4c. Newly Planted Vegetation: Other Landscaping

Rationale - The amount and type of vegetation designed into a site's landscaping greatly influences the land's ability to catch, filter and infiltrate stormwater. Generally, the larger the

percentage of native vegetation on the site, the more positive the ecological and water quality benefits to the environment.


Measurement - Use of different types of vegetation

- 2. Plant turf grass
- 1. Use of native vegetation only in buffer areas, turf grass and non-native landscaping elsewhere
- 0. Use of native vegetation in 50% of open space, turf grass and non-native landscaping elsewhere
- +1. Use of native vegetation in 50% of open space, turf grass and non-native landscaping elsewhere, and provision in homeowner's association rules to encourage the use of native vegetation on individual lots
- +2. Use of native vegetation greater than 50% in open spaces, and native vegetation encouraged or required in homeowner covenants/deed restrictions
- X Does not apply


Comments on site-specific constraints: _____

Total available points = 20

Development Example:

A 80-acre conservation development to be built on an old farm minimizes paved areas and reduces stormwater runoff. The proposed development also protects contiguous open space, but pays little attention to landscaping with native plants. The development scores 6 points (33%) under the CeDES evaluation system, earning it a  rating overall. Scoring on each criterion and the development's overall rating calculation are shown below:

- 1a. Percent Impervious Surfaces Relative to Conventional Development = +1
(40% decrease in streets, sidewalks, and driveway surfaces compared to a conventional design for the site)
- 1b. Preservation of Natural Features/Land Form Change = +1
(Grading of less than 30% of parcel and cut and fill minimized)
- 1c. Sediment and Erosion Control = +2
(No measurable soil loss)
- 2a. Stormwater Runoff Rate = +2
(>10% decrease in runoff rate)
- 2b. Stormwater Runoff Volume = +1
(No increase in runoff volume)
- 3a. Buildable Open Space = +1
(See example on p. 6)
- 3b. Environmentally Constrained Open Space = -1
(See example on p. 8)
- 4a. Development of Natural Resources Protection Plan = 0
(Natural resource inventory conducted with linkage to site design)
- 4b. Existing Vegetation: Tree and Native Plant Conservation = X (no score)
Does not apply: site was nearly entirely in use as a farm with few trees and no native vegetation with the exception of a small wetland
- 4c. Newly Planted Vegetation: Other Landscaping = -1
Use of native vegetation only in buffer areas, turf grass and non-native landscaping elsewhere

Final calculation: 6 total points out of 18 possible (33%) =  Rating
(20 available points minus 2 points for 4b. which did not apply)

A Project of the Critical Trends Assessment Program

THE UPPER DES PLAINES RIVER BASIN

AN INVENTORY OF THE REGION'S RESOURCES



**Jim Edgar, Governor
State of Illinois**



**Brent Manning, Director
Illinois Department of Natural Resources**



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Elevations in feet above
mean sea level

450-500

501-550

551-600

601-650

651-700

701-750

751-800

801-850

851-900

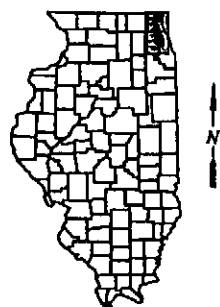
open water

— rivers and streams

— watershed boundary

- - - county boundary

• cities & towns



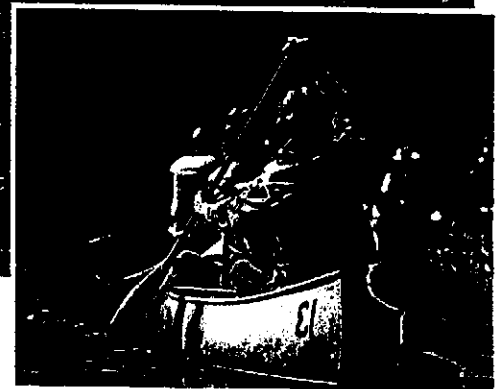
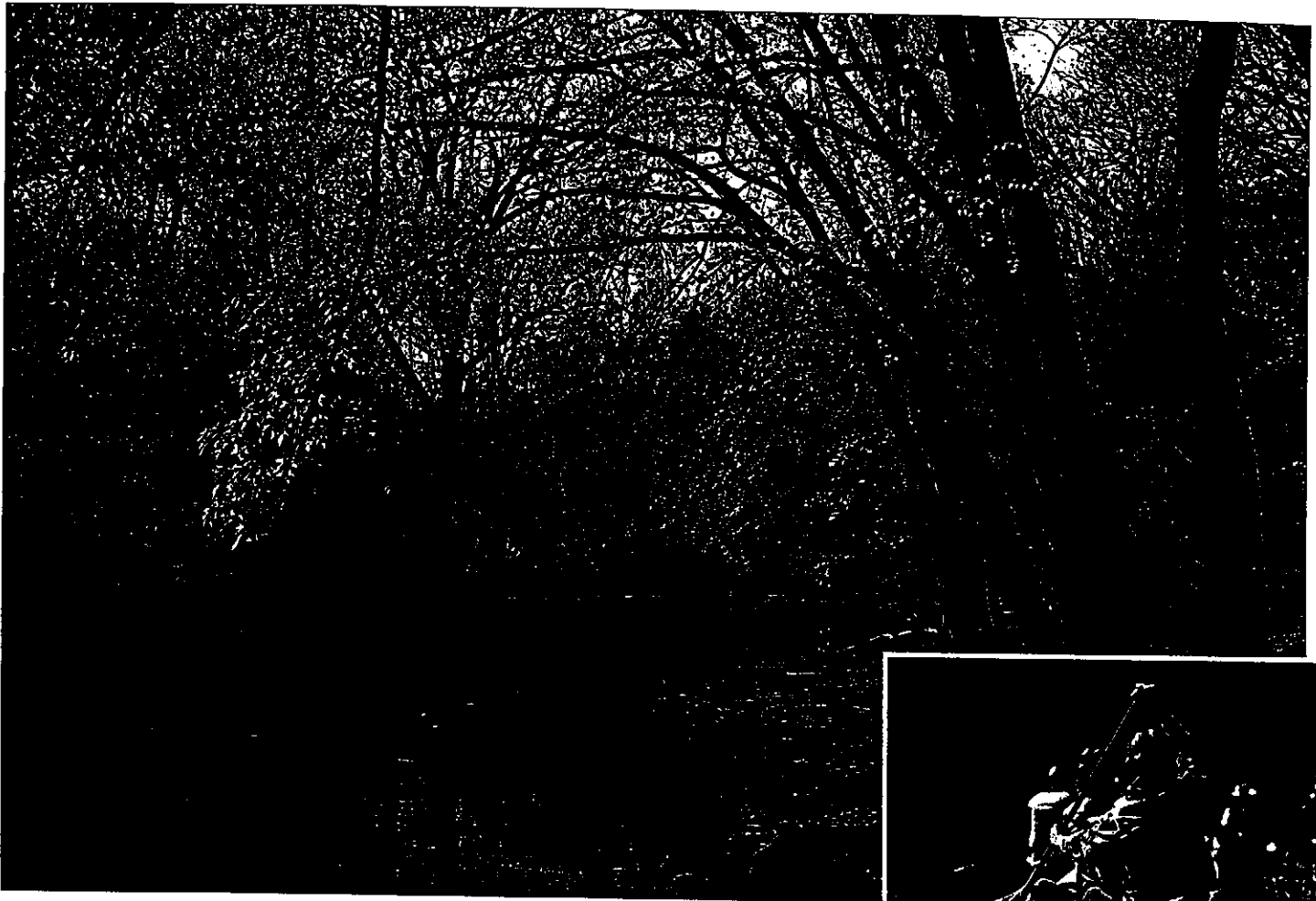
J. Hester and L. Smith, ISGS

0 5 10 15
Miles

THE UPPER DES PLAINES RIVER BASIN ELEVATION MAP

THE UPPER DES PLAINES RIVER BASIN

AN INVENTORY OF THE REGION'S RESOURCES



Take a canoe trip down the upper Des Plaines River from just north of the Wisconsin border south to the Cook County town of Lyons, and you can see the history of urbanization in Illinois laid out like a diorama. As the river moves through parts of Lake, Cook and DuPage counties, farms give way first to bedroom suburbs, then to 1990s-style "edge cities." Along the crowded southern part of the upper Des Plaines, "urban uses"—airport terminals to Toys 'R' Us—are ten times more concentrated than in Illinois as a whole and cover as much as 70% of the land.

No other natural Illinois river runs through such an urbanized

watershed; no other urban river still has so much nature left in and around it. The upper Des Plaines basin thus is uniquely situated to find answers to a new question about an old dilemma: If nature cannot be restored to its old place in Illinois' natural order, can it at least be admitted to a place in the new human one?

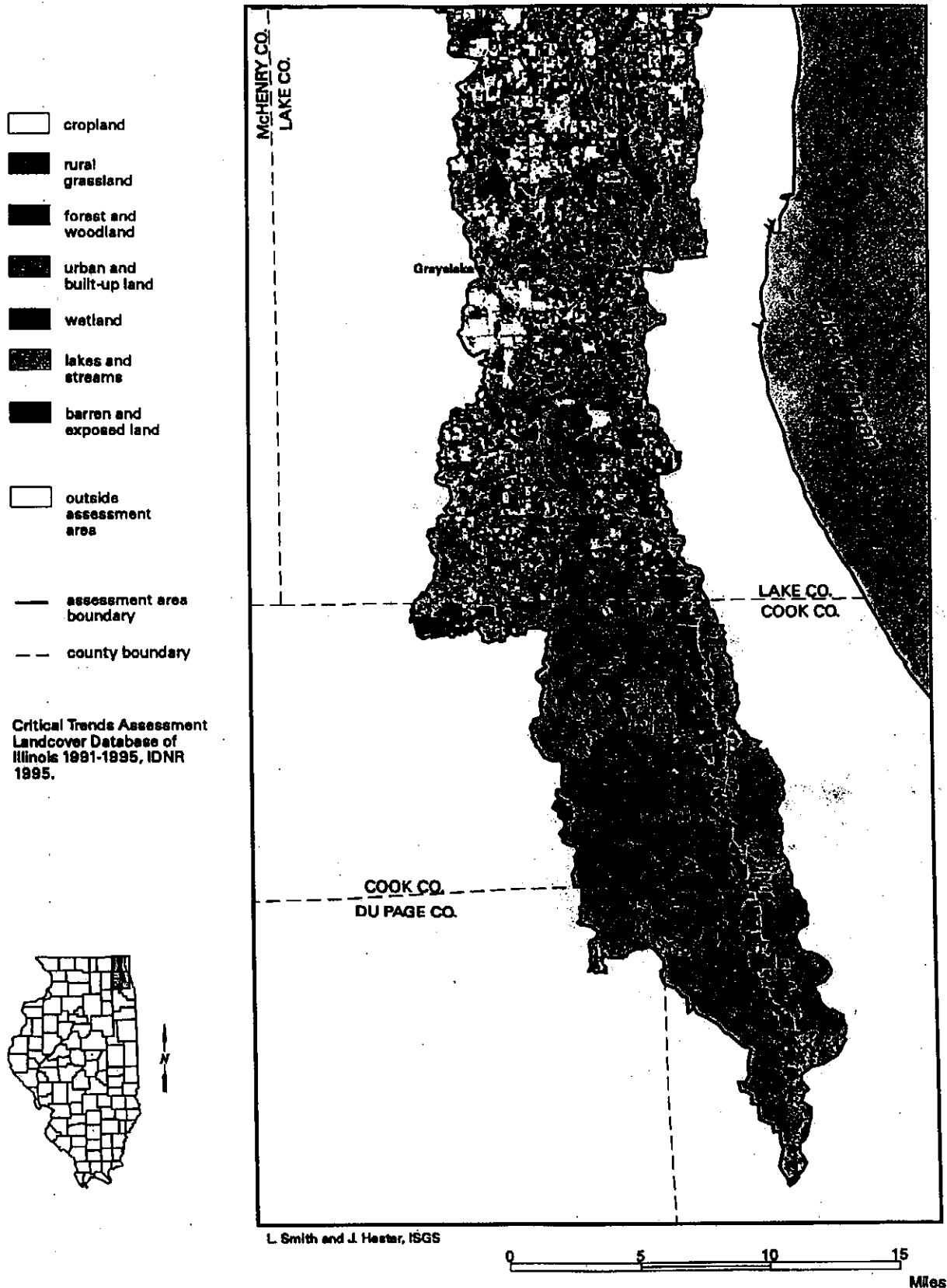
The Presettlement Des Plaines

As used here, "upper Des Plaines basin" refers to the river's approximately 346-square mile drainage area which served as the focus of a recent assessment of local natural resources by state scientists. Visitors who described the area in 1840 reported

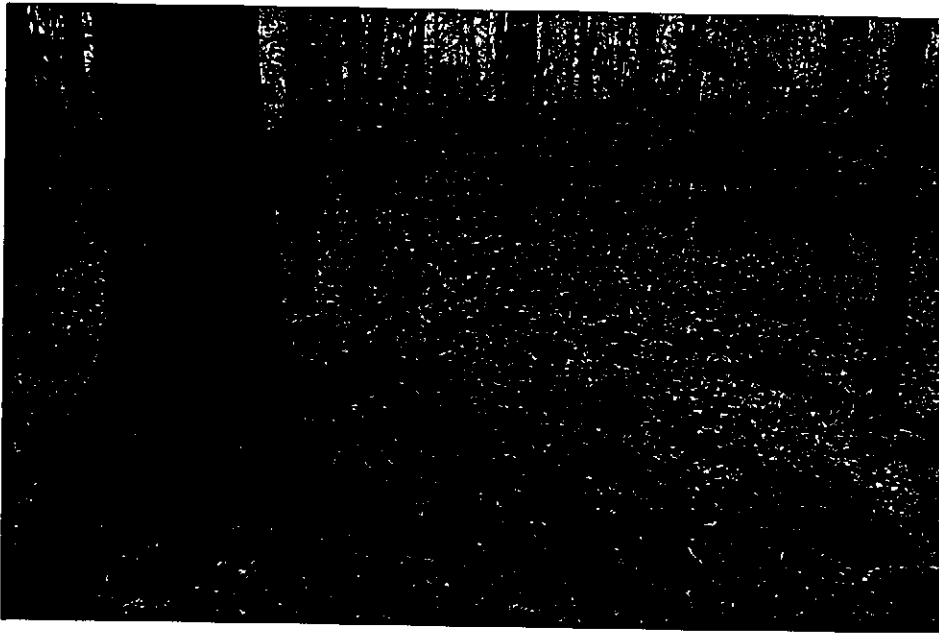
that the land cover in the upper Des Plaines basin consisted of 40% prairie and 60% forest and savanna. Soils that develop under wetlands are distinctive and remain so even when the water that formed them is drained away. Measuring the present extent of these soils, scientists conclude that about a quarter of the Des Plaines basin was wetlands of one kind or another.

Much of the landscape east of the river in southern Lake and northwestern Cook counties was covered with savanna and pockets of prairie (including wet prairie) and marsh.

THE UPPER DES PLAINES RIVER BASIN



UPPER DES PLAINES RIVER BASIN LAND COVER



*Approximately 18% of today's upper Des Plaines basin is woodland.
Spring woods with May apples, Ryerson Conservation Area*

Because the river blocked the advance of prairie fires driven by westerly winds, dense growths of trees flourished mainly on the east side of the river. (Remnants of these forests survive in Lake County as MacArthur Woods—a haven for rare warblers—and Lloyd's Woods nature preserves.) West of the river was a more complex landscape dominated by small lakes formed when blocks of ice melted after having been buried by glacial debris, leaving potholes in the surface.

This landscape existed during the 10,000 years or so after the great ice sheets ceased shaping the land and before Euro-American settlers began to reshape it. After 150 years or so of urbanization, little of it is left.

Approximately 18% of today's upper Des Plaines basin is woodland, mostly upland forest along the Des Plaines in forest preserves. Today, nonforested wetlands in the form of marshes, wet meadows, and ponds (the last often occurring as part of marshes) cover but 3.5% of the surface. Most of the

lakes (ponds larger than 20 acres) have long since been drained.

In the northern reaches of the basin, however, it is still possible to get a feel for that vanished landscape. No fewer than 167 pothole lakes survive in the Illinois portion of the upper Des Plaines basin, mostly in Lake County. Most of these lakes are small—only one is larger than 40 acres—and their mean size is about 22 acres. These lakes are nature's gift to developers who made them the centerpiece of resort towns, like Grayslake, that were reincarnated as suburbs a century later.

In scenic terms a post-glacial landscape of this sort offers little, but the basin is a place of subtle ecological variety. Mucky low spots that retain water most of the time are separated by ridges of pebbly clay glacial debris known as moraines. Soils vary too, in chemical composition and texture. In many places, for example, the presence of calcium-rich rock debris near the surface has turned the

The Area at a Glance

Δ The upper Des Plaines basin drains approximately 346 square miles. No other natural Illinois river runs through such an urbanized watershed; no other urban river still has so much nature left in and around it.

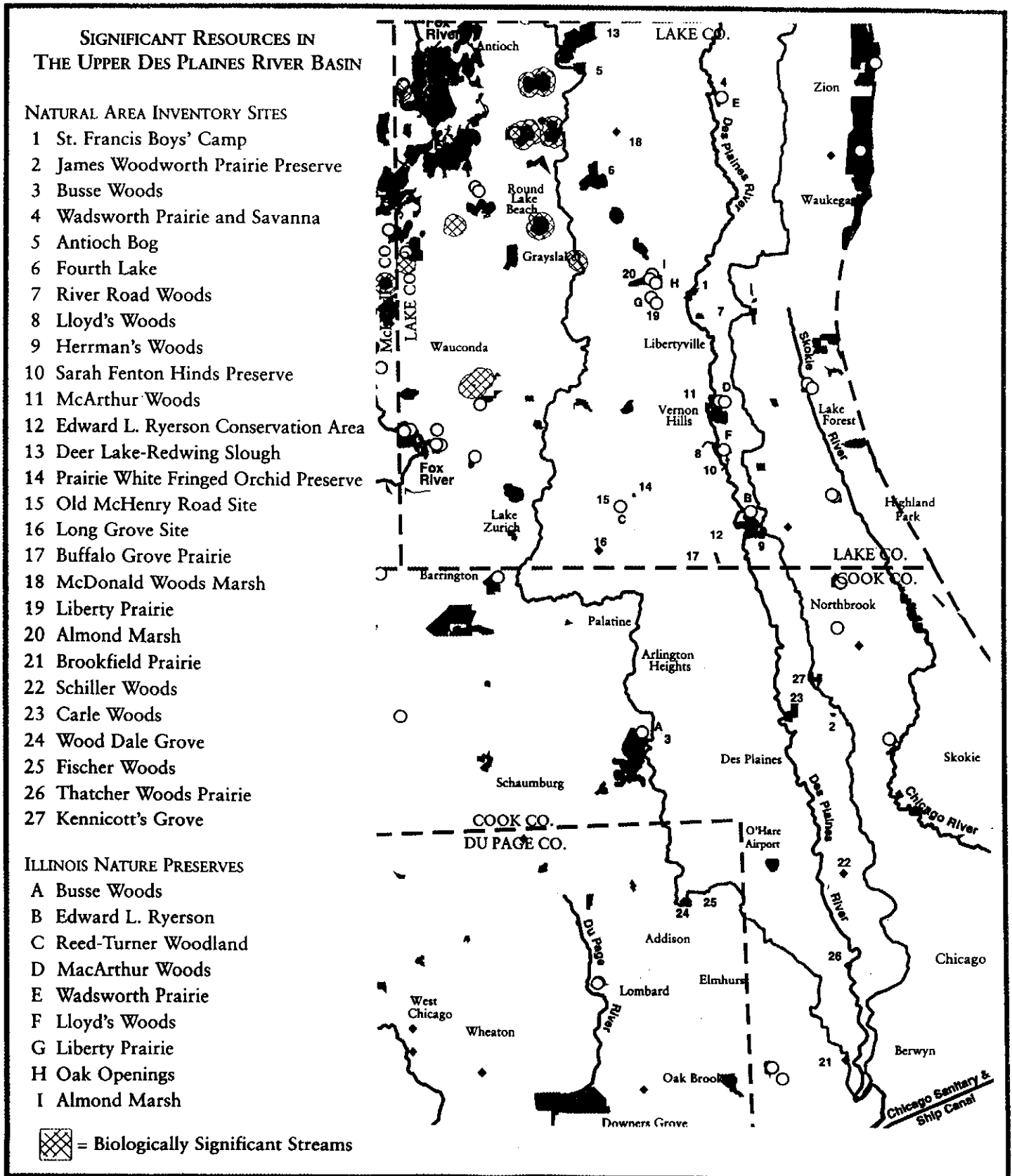
Δ Visitors who described the area in 1840 reported that the land cover in the upper Des Plaines basin consisted of 40% prairie and 60% forest and savanna; scientists estimate that about a quarter of the basin was wetlands of one kind or another.

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THE UPPER DES PLAINES RIVER BASIN



soils alkaline. The combination of different moisture, terrain, and soil types produces 16 distinct habitat types in the basin.

Several of them—bogs, fens, marl flats—are more typical of Canada than Chicago's collar counties. Most of the rare plants in the basin are more often found far to the north and northeast; the hairy white violet, for example, is common in boreal eastern Canada. Among the more exotic local habitats are calcareous floating mats. In lakes filled with cold oxygen-poor water, new plants grow faster than dead ones decay. The partially decomposed plants accumulate as a peaty mat that floats atop the water. A high-quality example may be seen at Fourth Lake in northern Lake County.

Among the plant life there are several species whose survival in Illinois is considered by state conservation experts to be threatened or even endangered, including downy willow herb, bog bedstraw, and common bog arrow grass.

A survey in the 1970s by the Illinois Natural Areas Inventory (INAI) found 26 top-quality remnants of presettlement natural communities in or within a few hundred feet of the upper Des Plaines basin. Nine of the basin's INAI sites have been designated Illinois Nature Preserves. Eight are in Lake County, including Liberty Prairie, Oak Openings, and Almond Marsh, which together form a complex of wet prairies, fens, sedge meadows, marsh, oak savanna, and oak woods that suggests the jumble of habitats that was typical of the basin 150 years ago.

Losses of presettlement habitat in the upper Des Plaines basin are less severe than in the state as a whole.

Natural areas amounting to nearly 2,300 acres survive. However, Category I sites—natural communities that meet the INAI's most exacting standards of ecological integrity—make up but 440 acres, or 0.2% of the basin. Of the nearly 90,000 acres of prairie thought to have been present in 1840, about 18 acres survive in high-quality condition. Of the estimated 58,000 acres of presettlement wetlands, about one-fifth is left, although only about 1% of that remains as the first European travelers saw them. In terms of acreage, there is thought to be as much forest in the basin today as then. Species composition in the local woods is rich—a typical chunk of upland forest harbors two dozen kinds of trees and nearly that many shrubs—but only 343 acres is undisturbed forest of high ecological quality.

Many other habitats were disturbed but not destroyed. The region's remnant savanna is typical of these unappreciated, often unrecognized tracts. Savanna is a not-quite-forest, not-quite-prairie ecosystem in which scattered large trees (usually oaks) dominate an open landscape of prairie grasses and forbs. Savanna used to cover half of Lake County alone, but today not one acre of savanna survives in the entire basin as an INAI Category I natural area. However, savanna damaged by plowing or grazing still exists across the basin.

Most large mammals, including the American bison, had been hunted out long before the Euro-American arrival. Several bird species—the sharp-tailed grouse and yellow rail among them—also vanished from the basin. However, the humanization of the basin's ecosystems doomed surprisingly few large animals. Forty-

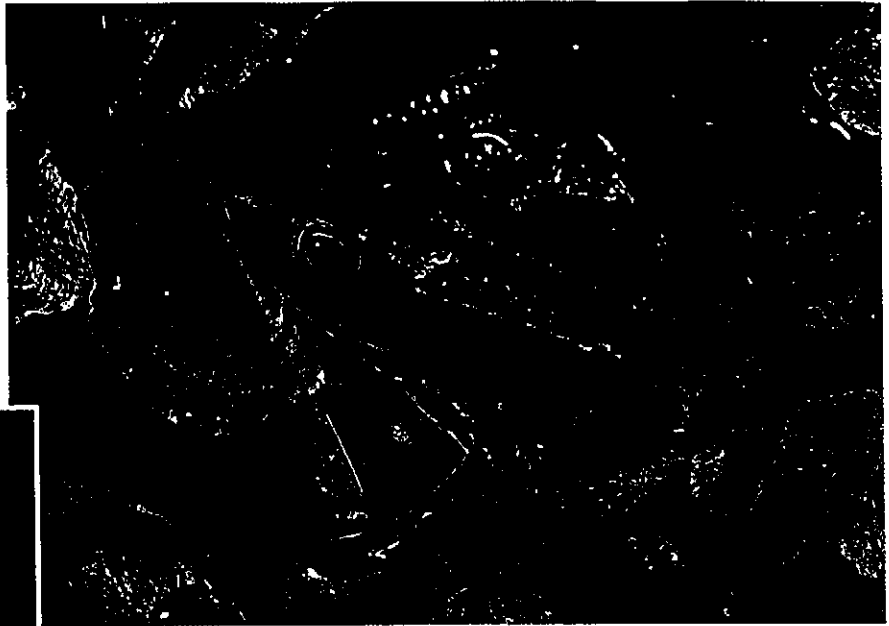
The Area at a Glance

Δ The combination of different moisture, terrain, and soil types produce 16 distinct habitat types in the basin. Several of them—bogs, fens, marl flats—are more typical of Canada than Chicago's collar counties.

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Δ Eight of the nine Illinois Nature Preserves in the basin are in Lake County, including Liberty Prairie, Oak Openings, and Almond Marsh, which together form a complex of wet prairies, fens, sedge meadows, marsh, oak savanna, and oak woods that suggests the jumble of habitats that was typical of the basin 150 years ago.

The green frog (right) thrives in upper Des Plaines habitats such as wetlands, forests, rivers, and creeks; the 13-lined ground squirrel (below) is a denizen of grasslands.



northern species like the least flycatcher, and far enough south that southern species such as the Kentucky warbler also nest here occasionally. Wetlands (especially the Deer Lake-Redwing Slough complex) are considered the most significant avian habitat in

the basin. Some three dozen bird species nest there, including 14 listed species such as the least bittern, the double-crested cormorant, and great egret. The basin also may be intensely used by migratory birds, from forest songbirds to various shorebirds, rails, and long-legged waders such as bitterns.

Human presence does stack the survival odds in favor of certain kinds of animals. Chicago's suburbanized hinterland is most congenial to adaptable generalist species able to feed and breed in widely varied settings. The gray squirrel, which ordinarily is a denizen of deep forest, is found in leafy basin towns like Libertyville and Arlington Heights. In

the wild, the Kirtland's water snake shelters in crayfish burrows, but the snake has been found in vacant lots under boards and other urban debris. Raccoons thrive on garbage, deer graze in home gardens often enough to be pests, and coyotes may be succeeding locally at the expense of the red fox. Thirty-nine or so bird species breed in developed land such as lawns and parks, making up a bird community that has no parallel in the natural world.

Species that need more specialized habitat tend to do less well in humanized landscapes. The water quality of the basin's streams, while improving, is not good enough to sustain the full panoply of riverine creatures found in similar but undisturbed streams. While limited data suggest that the array of aquatic macroinvertebrates—among them, worms, leeches, insects, and snails—is no less diverse than in most Illinois streams, mussel populations are much less varied. Mussels feed on stream bottoms, where many pollutants accumulate; the Des Plaines River is home to only

three mammal species are still known or are thought likely to occur here, along with 16 amphibian and 23 reptile species. Among the latter is the massasauga, a state-listed snake, which has been found in pockets of habitat along the Des Plaines River from the Ryerson Conservation Area near Lincolnshire to Willow Road in Cook County.

Bird life is especially varied. At least 270 of the 299 bird species that regularly occur in Illinois may be found here at least part of the year; diligent birders have spotted 116 species in a mere 33 acres of the Reed-Turner Nature Preserve in Long Grove. The basin lies far enough north that it is a summer home to

four mussel species, whereas Illinois' more pristine rivers boast as many as four dozen.

Sustaining the basin's fauna is an abundant and varied flora. Even an incomplete listing of vascular plants adds up to more than 600 species. Twelve bird species, two reptile, and one species of fish are on the official list of endangered or threatened species. So are 24 of the basin's plant taxa (most of them known from Lake County). The prairie white-fringed orchid once was widespread in northern Illinois prairies and wetlands, but today its survival in the U.S. is considered threatened by federal conservation officials. Scattered populations hang on in old fields and in cattail patches very near the basin's boundaries, and similar habitat within the

basin may still harbor other small populations.

The Humanized Des Plaines

Back in 1970, local urban planners predicted that within five years the dust and fumes from expanding operations at O'Hare International Airport, which at one point sits only a mile from the river in the southern end of the basin, was expected to render the environment unfit for businesses or residences for five miles in all directions.

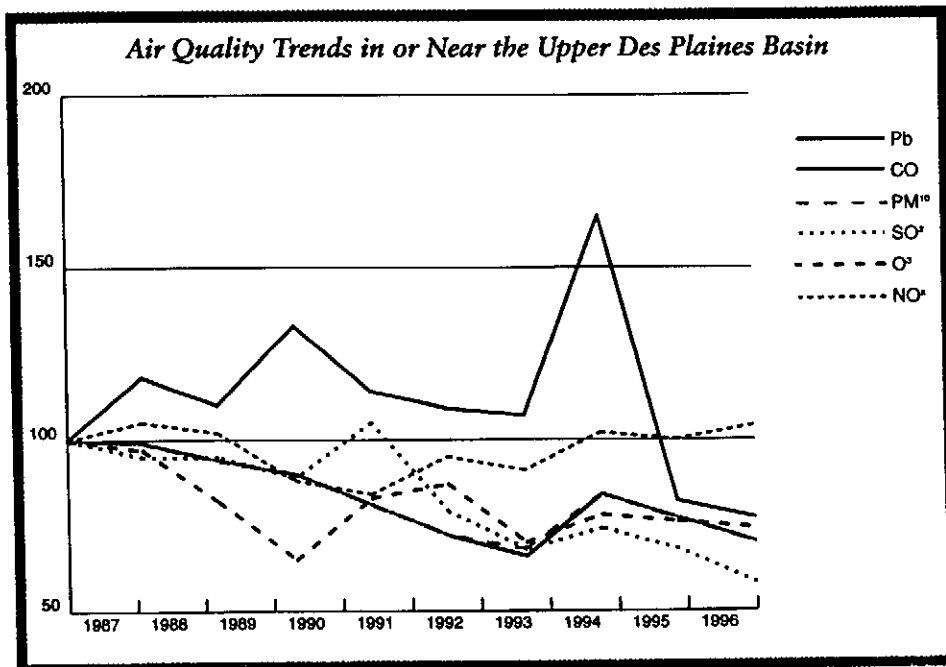
Thirty years later the dust is coming from the construction boom triggered by high property values around the airport. In the upper Des Plaines basin, as across the state, emissions of "criterion pollutants,"—substances regulated by federal law to

The Area at a Glance

Δ Losses of presettlement habitat in the upper Des Plaines basin are less severe than in the state as a whole. Natural areas amounting to nearly 2,300 acres survive. However, Category I sites—natural communities that meet the INAI's most exacting standards of ecological integrity—make up but 440 acres, or 0.2% of the basin.

Δ Of the nearly 90,000 acres of prairie thought to have been present in 1840, about 18 acres survive in high-quality condition. Of the estimated 58,000 acres of presettlement wetlands, about one-fifth is left, although only about 1% of that remains as the first European travelers saw them.

Δ Species composition in the local woods is rich—a typical chunk of upland forest harbors two dozen kinds of trees and nearly that many shrubs—but only 343 acres is undisturbed forest of high ecological quality.



Pb = lead (sources are primary and secondary smelters and old auto emissions still recycling in the atmosphere); CO = carbon monoxide (8-hour measurement, primarily auto emissions); PM¹⁰ = particulate matter (less than 10 micrometers in size); SO₂ = sulphur dioxide (from fuels with sulphur impurities, e.g. coal and oil); O₃ = ozone (reactions of hydrocarbons and nitrous oxide in the atmosphere); NO_x = nitrogen oxides (high temperature combustion, automobiles and power plants).

Forest Preserves

The upper Des Plaines basin contains no large federal parks or preserves, nor even one state park. (The basin includes nine State of Illinois nature preserves and 19 natural areas, but these are not meant for recreation in the usual sense.) The main recreation playgrounds are the chain of county forest preserves along the Des Plaines River itself. Here may be found opportunities for hiking, biking, ball games, picnicking, and nature lore, among other pleasures.

The loss of forest cover to development has been less severe in the basin than in Illinois as a whole largely because of northeast Illinois' pioneering forest preserve system.

Apart from losses for construction of the Tri-State Tollway through Des Plaines, the preserves are thriving, thanks to the broad political support the system enjoys. Indeed, voters have been receptive to expanding it. A 1993 Lake County bond referendum to raise \$30 million to purchase land for that county's Forest Preserve District—which already owns 6.4% of the county's land or 19,100 acres—passed handily.

The system was built opportunistically, through purchase or repossession of derelict land in the form of old farms or failed subdivisions. But bargains in land are getting hard to find in the upper Des Plaines basin. In the late 1990s, expanding existing forest preserves by acquiring adjacent developable property through condemnation ran into hundreds of thousands of dollars per acre. The average price per acre of any vacant land was nearing \$100,000 in some parts of suburban Chicago. Such prices make purchase by public bodies problematic politically as well as fiscally.

In addition to scenery and fun, the woods owned and managed by the Cook and Lake county forest preserve districts remain a rich refuge of species diversity in Illinois. The woods of the Ryerson Conservation area (owned by the Lake County Forest Preserve District) harbor 460 species of flowering plants, 64 species of birds, 19 species of mammals, and seven species of amphibians.

Their name notwithstanding, the forest preserve systems did not seek to preserve forest in their ecologically immaculate condition. The early forest preserve districts did not so much preserve forest as create them, by not interfering with natural succession and allowing old farm fields—many of them originally savanna—to revert to woods.

The mandate to preserve the region's forests "in their natural state" is taken more literally today by a new generation of managers. The founding forest preserve agency, the Cook County Forest Preserve District, was granted power to acquire land containing natural forests or lands for purposes of protecting flora and fauna and scenery.

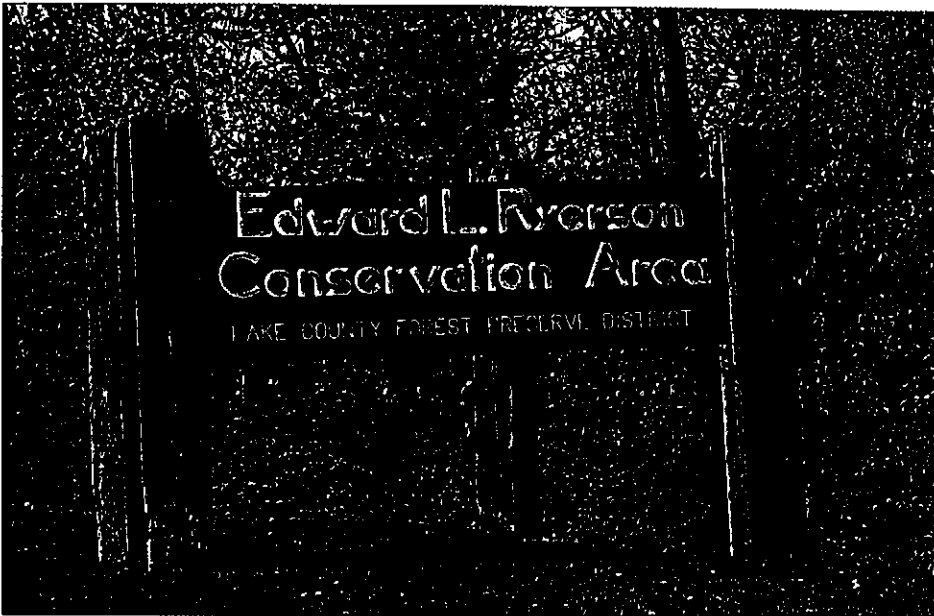
But what if the flora and fauna being restored are not considered scenic? The native landscape of northeast Illinois is not a landscape that people instinctively respond to. "Nature" to many Illinoisans still means

trees. The look of prairies is still not popular, although 20 years of proselytizing on their behalf means that they are no longer automatically derided as weedy-looking.

To help people learn to judge a landscape not only in aesthetic terms but also in terms of its ecological authenticity, forest preserves have become sites of environmental symposia as well as softball tournaments. Forest preserves have added environmental education managers to the list of specialists on the payroll.

But "natural" remains a term of disputable meaning. The mandate was easily satisfied during that system's first 75 years, when the agency sought to preserve nature, not specific native ecosystems. Thanks to the different circumstances of their genesis, "second-growth" forests are not just new forest, but new kinds of forest compared to what grew there before. Attempts to restore savanna in the preserves by ridding it of trees not native to that ecosystem have caused controversy inside and outside the various county agencies. A lot of people still find cutting down trees to preserve a native forest to be unnatural.





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protect public health—have been dramatically reduced since 1970. There is much less sulfur dioxide in the air thanks to cuts in the use of coal by power plants. Lead in soils and the air—formerly a grave public health risk in big city environs—likewise has been substantially reduced. Only at Lyons Township, in the heavily industrialized south end of the upper basin, did “small particulates” (fine dust from various sources) even occasionally exceed the 24-hour standard in the early 1990s.

Pollution of surface water has been reduced too, if less dramatically than air pollution. When the water quality of 38 lakes was assessed for 1994–95, only four showed even moderate impairment because of pollution, and 24 fully satisfied the uses to which they are put. However, water quality in 16 of these lakes has been declining, and their suitability for more demanding uses such as water supply or recreation could be

impaired if the trend continues.

About a quarter of the upper Des Plaines basin’s roughly 500 miles of streams has been assessed by the Illinois Environmental Protection Agency for quality. Overall water quality must be considered only fair. Too small in these reaches to carry cargo barges and redundant as a water supply, the upper Des Plaines River itself continues to function essentially as a sewer for the basin. Cities and towns do a much better job of treating sewage before they dump it into surface waters, but combined sewer systems still flush a lot of untreated sewage directly into the Des Plaines and its tributary streams when stormwater overwhelms treatment plants.

While pollution from point sources like factory smokestacks has abated, emissions from non-point sources have proven harder to control. Natural winds keep most of Cook County emissions from travel-

The Area at a Glance

Δ Savanna used to cover half of Lake County alone, but today not one acre of savanna survives in the entire basin as an INAI Category I natural area. However, savanna damaged by plowing or grazing still exists across the basin.

Δ Forty-three mammal species are still known or are thought likely to occur here, along with 16 amphibian and 23 reptile species. Among the latter is the massasauga, a state-listed snake, which has been found in pockets of habitat along the Des Plaines River.

Δ Bird life is especially varied. At least 270 of the 299 bird species that regularly occur in Illinois may be found here at least part of the year; diligent birders have spotted 116 species in a mere 33 acres of the Reed-Turner Nature Preserve in Long Grove.

Δ Wetlands (especially the Deer Lake-Redwing Slough complex) are considered the most significant avian habitat in the basin. Some three dozen bird species nest there, including 14 listed species such as the least bittern, the double-crested cormorant, and great egret.

Open Space

The term "open space" as used in urban planning has always suggested a sunny alternative to the closeness of the built-up, locked-in city of the 19th century. However, the suburban upper Des Plaines River basin of the late 20th century remains very open, as measured in terms of population densities and building heights. Much "open space" in the basin is in fact valued because it is closed; many forest preserve drives are popular because the dense growth provides an opaque green screen that hides nearby buildings.

"Open space" might more accurately be changed to "green space." What is significant about such space is that it is natural, not architectural. It is not necessarily native either; the unofficial aim of open space programs until recently was to preserve the aesthetics of the fast-changing countryside, not its ecological integrity. A commuter driving home may find immensely satisfying the view of a forest fragment that an ecologist considers degraded in terms of species diversity or mortality rate.

For years, farms were the *de facto* open space system in the upper Des Plaines basin. To this day many Illinoisans think of nature in terms of the cultivated agricultural landscape, not the wild angle of wetland

or woods.) Residents were able to simply appropriate views of the private farmscape as public amenity.

Today, Illinois-style grain and livestock farming appears doomed in the upper Des Plaines basin. Farm acreage in the region dropped 22% between 1978 and 1992 alone, a rate of loss that is much higher than in the rest of the state. In 1925 farms took up 38% of the land in the basin; by 1995 that had dropped to about 9%, and that is concentrated in the northern parts of the basin farthest from the urbanizing fringe. The loss of privately-owned open space means that its provision is increasingly seen as a public responsibility. Voters in Libertyville Township have even authorized a township Open Space District, a revealing extension of Illinois' tradition of special-purpose government.

Nature has become politicized in northeast Illinois as it has in few other places in Illinois. This is especially true in Lake County. In the late 1990s, slow-growth activists won election to the county board in Lake County, ousting a pro-growth coalition. The incumbent chairman of the county board was criticized during the race for pushing the \$12-million extension of Yorkhouse Road through wetlands in the northeast corner of the county, near the Des Plaines River Wetlands Demonstration Project site.



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*Coyotes may
be succeeding
locally at the expense
of the red fox.*



ing into the basin. Most of the air pollution is produced locally—mainly in the form of engine exhaust. Symbolically, the automobile tailpipe is to the upper Des Plaines basin of the 1990s what the factory chimney was to Chicago of the 1890s. Criss-crossed with expressways, tollways, and interstates, the larger region of which the basin is a part contains only 10% of Illinois roads (measured in miles) but they carry about 40% of the vehicle-miles traveled in the state. It is fitting that here, in an urban complex based on mobility, the only historical site worthy of national note is a drive-in restaurant—the nation's first McDonald's, which opened in Des Plaines in 1955.

Nonetheless, air pollution from vehicles has not risen nearly as fast as miles driven, thanks to cleaner-burning engines and fuels. In the early 1990s, most or all pollution monitoring stations in the upper Des Plaines basin reported only brief and minor violations of federal limits on ozone, the corrosive gas created when sunlight chemically transforms certain chemicals that are found mostly in auto emissions.

As in the case of air pollution,

surface water quality is compromised by hard-to-regulate nonpoint sources. Soils are washed into streams from field and building sites, as are de-icing salts from roads. Nutrients such as phosphorous leached from lush lawns and cropland feed algae that block the light and steal the oxygen that other living things need to thrive. At times, concentrations of Atrazine, a farm herbicide used in the northern reaches of the basin, exceed the federal drinking water standard.

Pollution is only one of the ways that people change the natural environment of the basin. Protecting urban properties from fires and floods also alters natural systems, as does building in them.

Fragmentation Construction of roads, fields, and houses divides once-intact forests, wetlands, or prairies into small habitat “islands.” Entire local populations of some plant and animal species may include only a few individuals. The smaller such local populations are, the more vulnerable they usually are to disease and genetic stress from in-breeding. Such splintered tracts also are often too small for species such as badgers that

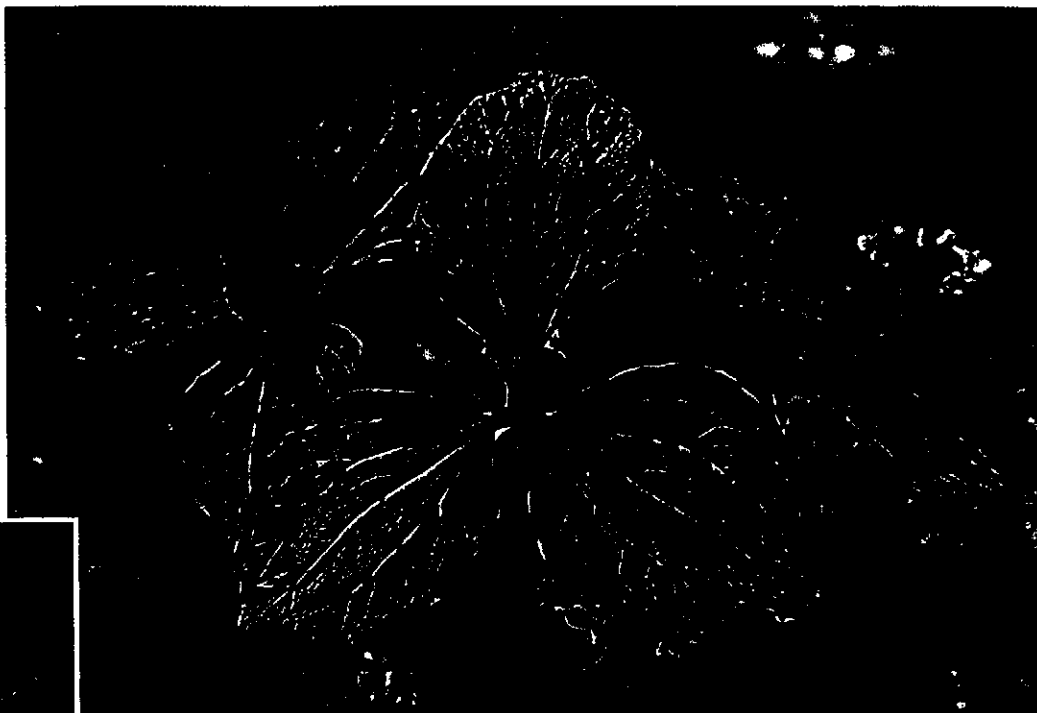
The Area at a Glance

Δ The water quality of the basin's streams, while improving, is not good enough to sustain the full panoply of riverine creatures found in similar but undisturbed streams. The Des Plaines River is home to only four mussel species, whereas Illinois' more pristine rivers boast as many as four dozen.

Δ Twelve bird species, two reptile, and one species of fish are on the official list of endangered or threatened species. So are 24 of the basin's plant taxa (most of them known from Lake County).

Δ Emissions of “criterion pollutants,” or those substances regulated by federal law to protect public health, have been dramatically reduced since 1970.

Popular wildflowers or "spring ephemerals" of the basin's upland forests flower and set seed in spring, before the new tree leaves block life-giving energy from the sun: red trillium (right) *Trilium recurvatum* trout lily (top below) *Erythronium albidum* and one of spring's first gifts, bloodroot (bottom below).



fully; the two largest contiguous forested tracts on the Des Plaines River (near Gurnee and near Libertyville) measure 239 and 106 acres respectively. The largest emergent wetland in the basin covers 355 acres—massive by Illinois standards—but the average is 3.7 acres. For comparison, the shopping space inside Schaumburg's Woodfield Mall is more than 57 acres.

Fire Looking back, an old settler of the basin noted that the almost annual prairie fires of those days did little harm to mature trees but "seemed to just fit the country for the wonderful crop of grass and the vast floral display that came year after year." The extent of savanna in the presettlement basin is thought to be explained in part by the occasional fires that swept the area, recycling nutrients, clearing the ground for new growth, and killing all but the fire-resistant oak species.

Without fire to stem plant invaders, savanna becomes dense woods. In deep woods, young maples untouched by fire survive to shade the forest floor. Plants that thrive in the sun—including oak seedlings—languish. As a result, the old oaks in the woods of the upper Des Plaines basin are not reproducing themselves. The forest floor, which usually is the most diverse part of the forest, also ends up with fewer kinds of plants. Popular wildflowers or "spring ephemerals" of the basin's upland forests flower and set seed in spring, before the new tree leaves block life-giving energy from the sun. (These include bloodroot, trillium, trout lilies, wild ginger, waterleaf, and wild geranium.) However, mid- and late-summer wildflowers struggle to bloom after the leafed-out trees block the sun. Fortunately these effects can be reversed. For example, some flowering plants, such as the state-listed northern cranesbill that occurs in one

demand far-flung home ranges. Many animals (especially reptiles and amphibians) seek out different habitats at different life stages; fragmentation severs natural landscape links between such habitats, making these migrations hazardous or impossible.

Forested wetland in the basin consists of 390 separate tracts, the mean size of which is 7.5 acres. Research suggests that many forest birds need the protection of at least 500 acres of woods to breed success-



Prescribed burns help stem woody plant invaders, protect savannas from becoming dense woods, and curtail young maples which, if allowed to run rampant, would shade the forest floor and keep spring ephemerals from thriving.

dryish forest in the basin, increase after ground fires are deliberately set to burn off competing plants.

Modification The upper Des Plaines is part of a hydrologically immature landscape whose present contours date from only about 10,000 years ago, when Lake Michigan's shoreline retreated to approximately its present position. Ten thousand years is not enough time for nature to carve an efficient system of rills, rivulets, and streams to carry away rainwater and melting snow from such a level surface. The open land of the basin thus remains dotted with so many emergent wetlands—nearly 1,700—that a map of them looks like a lawn littered with fallen leaves.

Wetlands unfortunately make farming and travel difficult. Even today they are an expensive complication to construction. A proposed 23-mile road project that would extend Route 53 to Interstate 94 near Waukegan carries a \$1-billion price tag in part because the road will cut through environmentally sensitive wetlands whose protection will require expensive special engineering.

Humans have long pre-empted nature as engineers of the watershed. Fields were tilled, and the wetlands along the upper Des Plaines were drained. Many natural lakes have had impounding structures installed at their outfalls to stabilize their levels, and now function as artificial lakes do. Low-head dams (mainly for flood control) have been built at five spots on the upper Des Plaines river, altering water levels and the movement of sediments, nutrients, and plants and animals in its channel.

Much of the water that flows through the upper Des Plaines in summer doesn't even come from its own watershed. Low flow in the basin's streams is increased by water that is taken from Lake Michigan and put, via lawn sprinklers, into surface streams. Sewage treatment similarly redistributes water. About 25% of the water in the river above Salt Creek—and when the river runs low, perhaps as much as 95%—consists of treated water from sewage plants; because of it, average flows in the Des Plaines are 80% higher today than in the 1940s and 1950s.

The Area at a Glance

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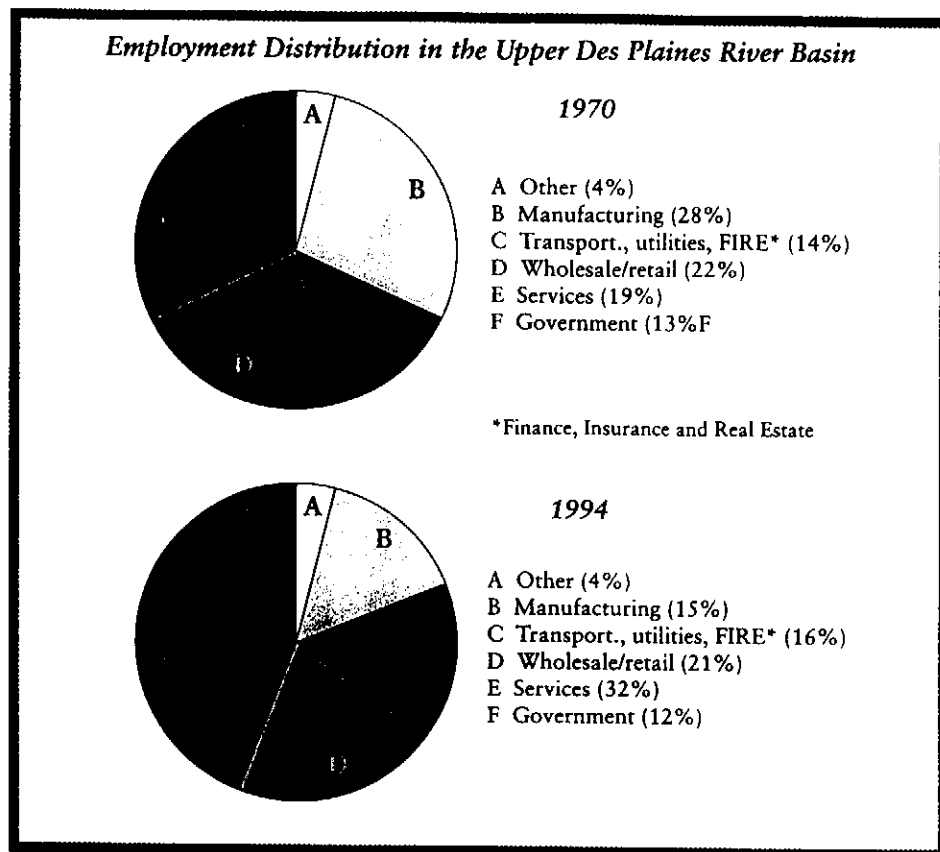
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Such single-minded alteration of a basin's drainage is now widely recognized as having hidden costs that can rival or exceed its obvious benefits. Wetlands store immense amounts of floodwater, reducing peak flows during floods. Riverine wetlands also function as natural water purification systems, allowing suspended soil particles to settle out of the water. Experiments showed that artificial wetlands in the basin trap 88% of sediments contained in water passing through them.

Exotics An arkful of non-native animals and plants have been introduced to the upper Des Plaines basin, often with unintended ecological effects. Pet dogs and cats prey on songbirds in forest preserves. Rusty crayfish were introduced to the Des Plaines River by fishermen who bought them as bait and dumped the survivors into the water, where they outcompete the native (and ecologically similar) clearwater crayfish.

Non-native plants are an even more problematic presence. About 70 of the vascular plant species now found in the basin are not native to it. Escapees from suburban yards such as the common lilac, orange day lily, yucca, and common periwinkle are so familiar a part of the humanized landscape of northeast Illinois that many people mistake them for native plants. Roughly 30 introduced plant species have adapted so well to the disturbed ecosystems of the suburbs that they have become pests. Glossy buckthorn, highbush cranberry, common buckthorn, bush honeysuckles, bittersweet nightshade, and purple loosestrife are ubiquitous and probably permanent additions to the region's landscape. Garlic mustard is invading forest



floors, reed canary grass has taken over more than one marsh, and spreading Kentucky bluegrass compromises the floristic integrity of local prairies.

Urbanization Changing country into city is the most widespread and obvious form of ecosystem modification in the upper Des Plaines basin. Urbanization is the third of the great transformations of the basin's landscape in the past 150 years. The first was conversion of the post-glacial landscape into farms, which began around the 1830s. The second was suburbanization, which saw farms gradually replaced by residential subdivisions beginning in the late 1800s and resuming with explosive energy after World War II.

Urbanization began in earnest in the 1960s. No longer do the suburbs

consist of bedroom communities linked by shopping malls. The economic base of the basin is diverse and growing. It consists of office parks (many of which house corporate headquarters), R&D facilities, and lodging and conference facilities. "Clean" industries like the one-million-square-foot-plus cellular phone "facility"—they are no longer called factories—that Motorola Cellular Subscriber Group built in Arlington Heights are this era's steel mills. Warehouse and distribution operations stand next to pharmaceutical labs or high-tech shops like Des Plaines's Scientific Device Laboratory. As the density of business in the region has increased, a supporting infrastructure of experts—from accountants and financial advisors to architects, marketing consultants, and

business administrators—has been built up.

No surprise, then, that the number of jobs in Lake County is twice what it was in 1970, or that in the late 1990s it was increasing at nearly 3% a year. As a result, Lake County has quadrupled its population since World War II (a net increase of 56,000 residents between 1990 and 1995 alone), part of a long-standing shift of the state's population to northeast Illinois.

Resources Then and Now

In the days of the French fur traders who gave the river its name, the economy of the upper Des Plaines basin depended substantially on the extraction of local resources, mainly furs. Later, farmers exploited local mineral resources in the form of soils. Today the most precious natural resource is land—not as a repository of soil or

minerals, but simply as a stable platform on which to build things. The basin contains many rich sand and gravel deposits, for example, but land atop them is too valuable to be dug up, so these essential building materials are mostly imported from remoter quarries.

Another still-vital resource that is taken from the ground is water. Flat as it is, there are few natural sites to make into water supply reservoirs. Aquifers in bedrock are the main source for most farm, factory, and public water supplies in the basin. Together they withdraw 7.2 million gallons per day (mgd).

That figure reflects a recent downward trend in groundwater withdrawals. Beginning about 1950, Chicago suburbs were withdrawing groundwater from the deep-lying Ironton-Galesville sandstone aquifer faster than nature could recharge it.

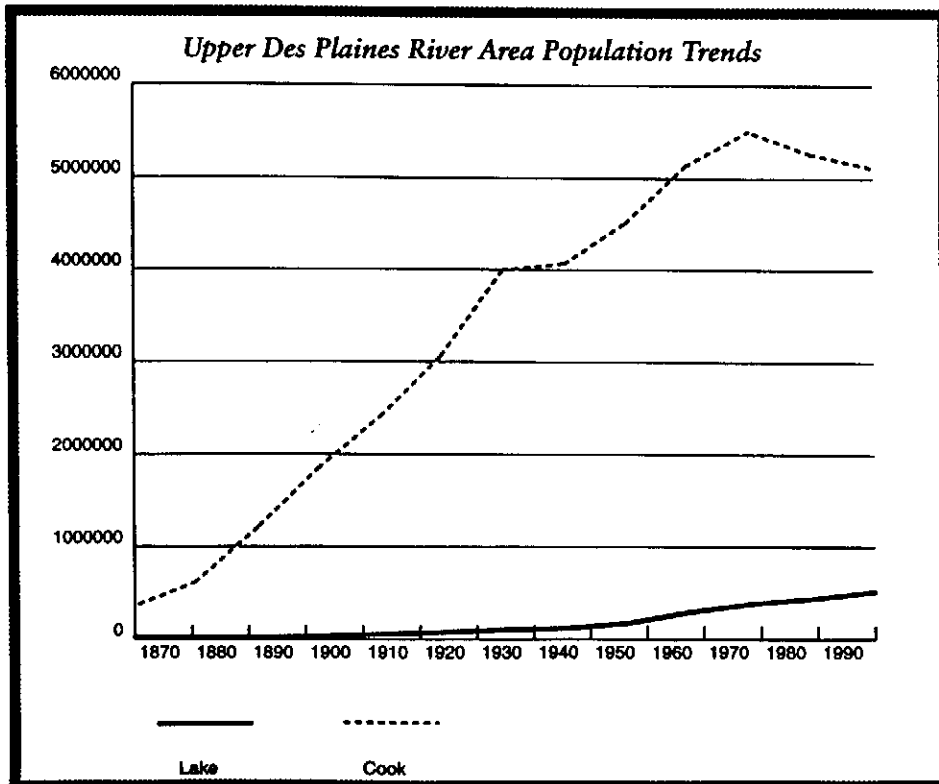
The Area at a Glance

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Water levels in some local wells eventually dropped more than 1,000 feet, with lesser declines recorded as far away as Wisconsin. This "mining" of groundwater led to court action by Wisconsin, which led in turn to a long-range plan to reduce pumpage from that aquifer system. In the 1980s many Chicago suburbs began to draw water from Lake Michigan, thus reducing groundwater withdrawals to levels closer to natural recharge rates. Withdrawals for public drinking water, for example, dropped from 15.3 mgd in 1990 to 4.3 mgd in 1995.

Apart from buildable land and water, the natural realm remains a source of visual amenity and diversion. Pleasant views add taxable value to local housing stock, and an affluent public presses local officials to expand opportunities for outdoor recreation such as hiking, birding, and especially biking. Construction of bike trails is ongoing. For example, the Des Plaines River Trail will extend 33 miles (23 miles have already been built) from the Wisconsin border to the Illinois River.

Market hunting decimated populations of waterfowl and other birds to fill Chicago's tables. (The passenger pigeons that once roosted in the woods along the upper Des Plaines were gone by the 1890s.) Hunting for sport in the basin has declined not because there are too few animals, but because there are too many people. Firearm deer hunting is not allowed in the crowded basin, so many local hunters travel out of state for sport.

Fishing is more popular, but here too the region's share of license sales is lower relative to the rest of the state. Many residents bent on angling also venture out of the immediate

area, to spots on the Kankakee River or to Wisconsin. As the basin's natural fishing holes disappear, they are replaced by artificial fishing holes in the form of many small fishing lakes like Belleau Lake located just southwest of Rand Road and I-294, which is stocked with rainbow trout in spring and fall and also offers large-mouth bass, yellow perch, bluegill, and bullhead catfish. Such managed waters appeal to anglers who seek fish and not a wilderness experience.

A commercial water park in the river's namesake town offers customers a ride in an inner tube "down a lazy river" that is in cleanliness at least superior to the real one that rolls nearby, unused. Nor is the Des Plaines a pleasure boater's paradise. The rifles and rapids that made the early Des Plaines a dangerous stream to boat on are gone, but today's river lacks the open water that draws power boaters to the Fox River and Chain O' Lakes or to the Lake Michigan shore.

However, the progressive, if slow, restoration of water quality is making the stream a more attractive recreational choice, especially as a canoeists' stream. The canoe was the means by which the region was explored, and it remains the preferred vehicle for those wishing to enjoy the quiet of smaller streams like the Des Plaines at a leisurely pace.

An Outdoor Laboratory

Management by humans in many cases is the only means to stabilize ecosystems too fragmented or too disturbed to sustain themselves. For example, disturbed ecosystems left in a natural state—meaning unperturbed by people—do not thus automatically recover their original native state. An

The Area at a Glance

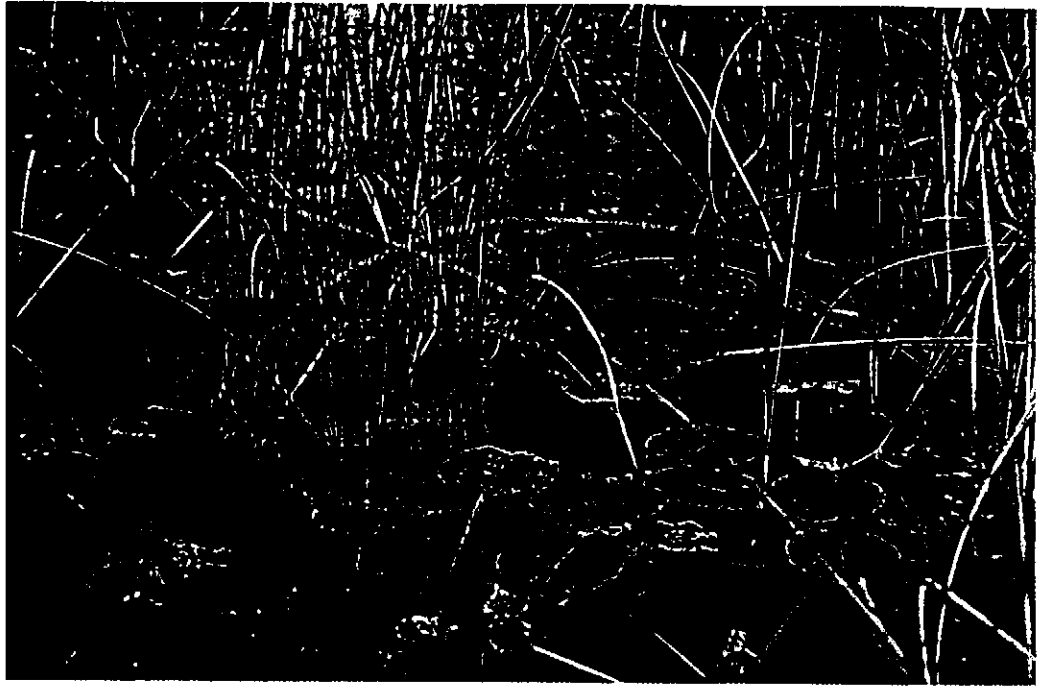
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Δ The economic base of the basin is diverse and growing, and the number of jobs in Lake County is twice what it was in 1970.

The Des Plaines River Wetlands Demonstration Project consists of 450 marshy acres along 2.8 miles of the river in northern Lake County. Experiments showed that artificial wetlands in the basin trap 88% of sediments contained in water passing through them.



open savanna, left alone, will become dense, shrubby forest. A sedge meadow, once flooded—as one on Indian Creek near Gilmer was recently flooded by a beaver pond—will probably not revert to sedge meadow if it is drained. Instead, it will become a wet meadow as it is taken over by plants that thrive in silted-up areas, like reed canary grass.

The basin has become an outdoor laboratory for experiments in the restoration and reconstruction of habitats. Probably the best known is the Des Plaines River Wetlands Demonstration Project, opened in 1990 after ten years of planning. The project site consists of 450 marshy acres along 2.8 miles of the river in northern Lake County. Owned by the Lake County Forest Preserve District, the site had been drained, plowed, quarried, and grazed. The terrain was reconfigured and replanted so that water pumped into it from the river moved slowly back into the channel through four wetlands. The site

quickly attracted waterfowl. More important, tests confirmed that water quality improved during its leisurely progress through the wetland. Plants caught and held most sediments, and excess nutrients in the river water were consumed by microorganisms and plants so efficiently that 65% to 80% of the water's excess phosphorus was removed.

Driven partly by federal regulations and partly by desire to find lower-cost "softer" solutions to chronic flooding problems, municipalities across the basin are experimenting with restoring and recreating wetlands to both reduce pollution and reduce floods. Libertyville Township, for example, plans to tear out drainage tiles and regrade an 80-acre cornfield it owns to create new wetlands. The \$1.2 million project will serve as a "wetland mitigation bank." The U.S. Clean Water Act requires that for every acre of wetland destroyed as a result of public or private development,

at least one acre of wetland must be created elsewhere. Developers who want to fill in a wetland elsewhere in the Des Plaines River watershed can satisfy that obligation by contributing toward the cost of building wetlands on the township's property.

Another approach is to restore damaged but still viable ecosystems. As noted, undegraded bits of presettlement habitat are rare in the upper Des Plaines basin, but many damaged sites could be restored to relatively high levels of ecological integrity. One such project is a damaged savanna that is regenerating at the Reed-Turner Woodland, a nature preserve in Lake County. Cutting brush and periodic burning are restoring savanna-like growing conditions.

Plans are underway to link public stream margins, forest preserves, roadsides, even golf courses with appropriately managed private and commercial sites. (Some local corporate campuses have been landscaped

using native plants.) The hope is to create corridors of protected land that allow animals to move through an otherwise perilous landscape.

Restoration, reclamation, and re-creation of ecosystems are all emerging sciences, and not everything being tried will work. Early experiments have made plain that carefully engineered artificial wetlands can catch and hold floodwater, filter sediments, absorb excess fertilizers and other chemicals, and attract waterfowl searching for places to rest and feed on annual migrations. (The Libertyville Township project is expected to attract migratory fowl such as tundra swans and blue-winged teals.) Recreating the botanical complexity of a true wetland is much harder. Because the upper Des Plaines basin is so fragmented, few wetland plants still grow nearby whose seeds might colonize rebuilt habitats. It may take 50 years to get a wetland that resembles a natural system in terms of species composition.

What is true of wetlands seems to be true of all recreated ecosystems. The recovery of once-grazed forests appears to be slow, and invasions by pest plants can be fought off only by management that is as aggressive as they are, such as repeated prescribed burns. Restored savanna at Wadsworth Savanna and Oak Openings nature preserves are species-poor and so far have not developed into communities that match nature's species richness or structure.

Natural systems are not only complex but constantly in flux. Tinkering with any part of one usually shifts it in directions that are not always predictable or desirable. The white-tailed deer, Illinois' largest and most coveted game animal, was considered extirpated in Illinois by 1901. As farm fields reverted to woods and new understory grew in woods no longer grazed by livestock, the animal's habitat expanded. More food (and fewer natural predators) triggered a deer population explosion.



The white-tailed deer population, almost extirpated in 1901, has exploded due to the abundance of food and fewer natural predators.

The Area at a Glance

△ Lake County has quadrupled its population since World War II (a net increase of 56,000 residents between 1990 and 1995 alone), part of a long-standing shift of the state's population to northeast Illinois.

△ In addition to buildable land and water, the natural realm is a source of visual amenity and diversion. Construction of bike trails is ongoing. When finished, the Des Plaines River Trail will extend 33 miles from the Wisconsin border to the Illinois River. The progressive restoration of water quality is making the stream a more attractive recreational choice, especially for canoeists.

△ The basin has become an outdoor laboratory for experiments in the restoration and reconstruction of habitats. The Des Plaines River Wetlands Demonstration Project consists of 450 marshy acres along the river in northern Lake County that have been reconfigured and replanted. The site quickly attracted waterfowl, and tests have shown that water quality improved as it progressed through the wetland.

The Liberty Prairie Open-Space Reserve near Grayslake is a cooperative interagency project among county and township agencies and private landowners.

A "macro-site" of approximately 2,500 acres combines homesteads, prairie, wetland, and forest. Homeowners pick forb and grass seed in fall (right) to help enrich the site's prairie habitat. Below, one of the roads that leads through protected prairie to homes nestled into their natural surroundings.



The forests of Illinois are now home to more white-tails than were thought to have been present at settlement. In many parts of the upper Des Plaines basin deer are a road hazard and garden pest. Overbrowsing by deer is a serious problem in the northern flatwoods within Busse Woods, the 440-acre nature preserve near Elk Grove Village in Cook County. Deer devastate delectable plants (including wildflowers like the bellflowers) and leave untouched bad-tasting exotics with thorns or bristly fruits. Deer thus act as agents of natural selection, favoring such introduced species as Missouri gooseberry and buckbrush over native ferns, orchids, and trilliums.

Restoration

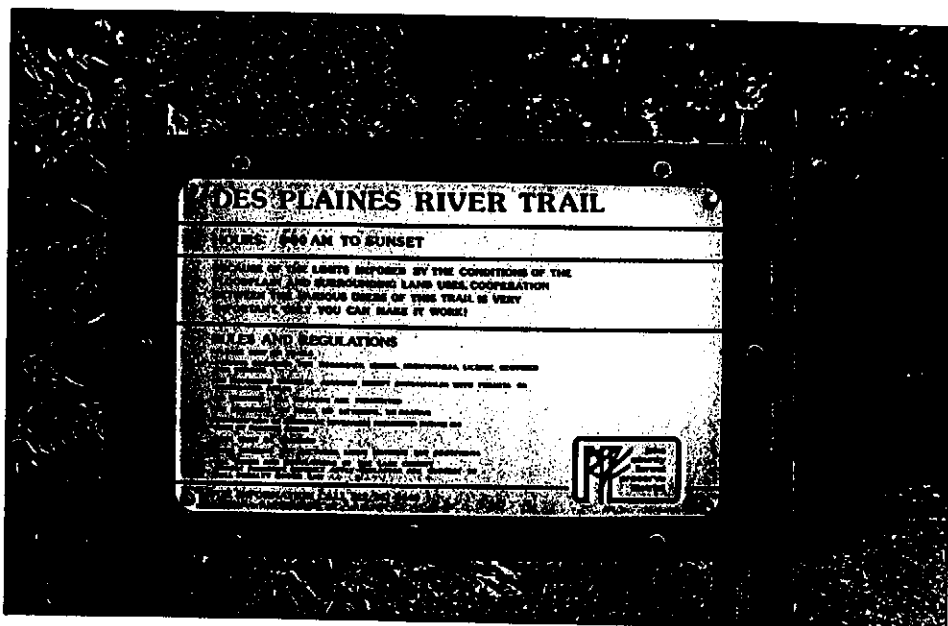
The pace of conversion will vary, but the city will eventually encompass all the upper Des Plaines basin. New single-family homes are larger than ever and sit on larger lots.

Competition among municipalities for taxable development encourages building on virgin sites rather than more intensive use of existing commercial infrastructure. Here and there in the basin, development is being made more dense and thus more land-efficient (usually in land-locked suburbs like Arlington Heights). However, the general trend is for developers to continue to move farther out into the hinterland in search of unbuilt land.

Nature—usually in its simplest form as "non-city"—has always been at the heart of the suburbs' appeal, and thus its economic future. Rural amenities are as crucial as good schools and low taxes in attracting

new residents. From local governments' perspectives, the continuing loss of "nature," broadly defined, is an economic development issue. Already a generation of house buyers has passed up the upper Des Plaines basin in favor of remote Kane and McHenry counties, hoping to find there a setting for daily life that has been lost in much of Lake and Cook counties over the past 20 years.

The loss of the basin's quasi-rural scenery to construction is transforming a once-public amenity into a private one. A new generation of subdivision designs seek to duplicate within developments the countryside that has largely disappeared outside them. A typical Lake County "conservation community" encompasses a small lake, 275 acres of surrounding wetlands, and space reserved for parks. Such techniques are a further elaboration of the old impulse to capture and tame nature in the backyard. The difference is that these new communal "backyards" are large enough and managed in ways to provide not just pretty views from



Concerned citizens take their stewardship of natural resources seriously. The Des Plaines River Trail is part of the Des Plaines River Greenway, which in turn is a key part of the 4,200-mile Northeastern Illinois Regional Greenway Plan—recreation, open space, and habitat in a single (albeit complex) entity.

kitchen windows but useful feeding and nesting sites for animals.

The need to make maximum use of scarce land is changing the way public decision-makers do their jobs too. Wetlands, as noted, are being embraced as pollution control systems as well as open space. Forest preserves not only offer visual amenity but also serve as wildlife corridors. A model is the Des Plaines River Trail, which is part of the Des Plaines River Greenway, which in turn is a key part of the 4,200-mile Northeastern Illinois Regional Greenway Plan—recreation, open space, and habitat in a single (albeit complex) entity.

Public officials are not only thinking more about ecology in their cities, but thinking about their cities in more ecological terms. The metropolis that has evolved in the basin is itself a complex and interdependent entity. (There are dozens of municipalities abutting the Des Plaines River.)

Flooding and traffic congestion (the latter a key cause of air pollution) are only two of the "green" problems whose cause and cures transcend local government boundaries, and which must be imagined, and managed, in regional (or at least county-wide) terms. Illinois' tradition of local government autonomy has kept management authority over natural resources from being invested in any single agency. Local authorities try to achieve the same kinds of official ends via complicated *Ad Hoc* coordination.

Two examples of many: The Liberty Prairie Open-Space Reserve near Grayslake is a cooperative inter-agency project among county and township agencies and private landowners to establish a "macro-site" of approximately 2,500 acres. A 1997 workshop called "People on the Water: Planning Water Trails For Northeastern Illinois" was a first step toward what organizers hoped would

The Area at a Glance

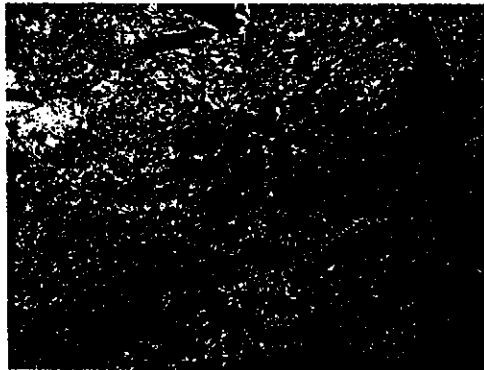
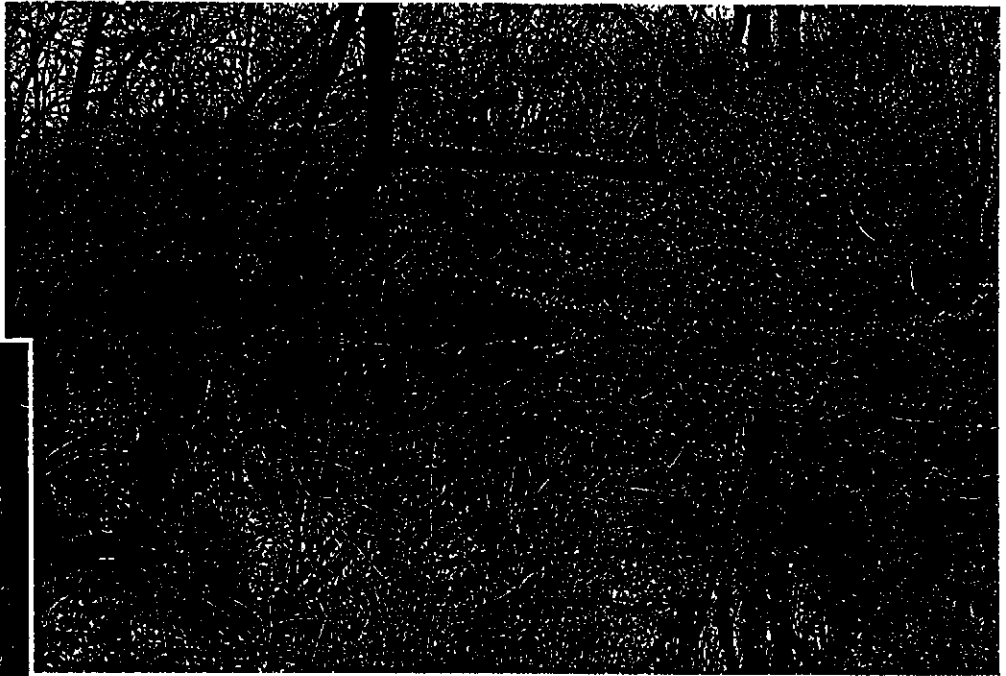
Δ Municipalities across the basin are experimenting with restoring and recreating wetlands to reduce both pollution and flooding.

Δ Damaged sites can be restored to relatively high levels of ecological integrity. A damaged savanna is regenerating at Reed-Turner Woodland, a nature preserve in Lake County. Cutting of brush and periodic burning are restoring savanna-like growing conditions.

Δ Plans are underway to link public stream margins, forest preserves, and roadsides with appropriately managed private and commercial sites to create corridors of protected land that allow animals to move through an otherwise perilous landscape.

Δ Public officials are not only thinking more about ecology in their cities, but thinking about their cities in more ecological terms. The Liberty Prairie Open-Space Reserve is a cooperative inter-agency project among county and township agencies and private landowners to establish a "macro-site" of approximately 2,500 acres

*Four seasons
in the
upper Des Plaines*



be a regional water trail system through several towns and counties in the basin. Sponsored by the Illinois Department of Natural Resources, Northeastern Illinois Planning Commission, Openlands Project, and the Illinois Paddling Council, the workshop's agenda included not only access and liability but intergovernmental cooperation. As veteran organizers will attest, establishing a new trail system is like establishing a prairie—success takes much longer than even pessimists usually expect, and the things that take root and

grow are not necessarily the ones that were expected when the process began.

It seems likely that the greening of the basin will prove to be a durable public priority like keeping taxes low, controlling floods, protecting views, or reducing pollution. It is possible that some combination of public and private enterprise will someday provide nature as it provides other complex systems on which basin residents depend, from transportation and water supply to the electrical grid and telephones. Whatever form it takes, nature is coming to be understood as

more than a presence (much less an obstacle to development), rather as the context within which development must take place. The fundamental question of natural resources management in the upper Des Plaines basin—not how to keep the city out of nature but how to make room for nature in the city—may yet find an answer. ▲▲

In addition to coordinating IDNR programs with those of Ecosystem Partnerships, the Ecosystems Program:

- provides technical assistance to the partnerships, such as resource management plans for use by participating landowners;
- assesses resources in the area encompassed by each Ecosystem Partnership, collecting data that the local partners themselves may use to set project priorities and design projects, and supplying scientific support to ecosystem partners, including on-going monitoring of Ecosystem Partnership areas;
- funds site-specific ecosystem projects recommended by each partnership. Such projects may involve habitat protection and improvement, technical assistance, and research and education, including projects that seek to expand the relationships between natural resources, economic development, and recreation.

To provide focus for the program, IDNR developed and published the *Inventory of Ecologically Resource-Rich Areas in Illinois*; detailed regional assessments are being completed for resource-rich areas in which a public-private partnership is formed.

The Upper Des Plaines River Basin: An Inventory of the Region's Resources is based on one of these assessments, the *Upper Des Plaines River Area Assessment*. The assessment was compiled by staff of IDNR's Division of Energy and Environmental Assessment, Office of Realty and Environmental Planning; the Illinois State Museum, the Illinois Natural History, State Geological, State Water Surveys, and the Waste Management Research Center of IDNR's Office of Research and Scientific Analysis; and Ecological Services of Urbana, Illinois.

The *Upper Des Plaines River Area Assessment* and all other CTAP and Ecosystems Program documents are available from the IDNR Clearinghouse at (217)782-7498 or TDD (217)782-9175. Many are also available on the EcoForum Bulletin Board at (800)528-5486 or (217)782-8447. Documents also are available on the World Wide Web at

<http://dnr.state.il.us/ctap/ctaphome.htm> and

<http://dnr.state.il.us/c2000/manage/partner.htm>

For more information about CTAP, call (217)524-0500 or e-mail at ctap2@dnrmail.state.il.us; for information on the Ecosystems Program, call (217)782-7940 or e-mail at ecoprgr@dnrmail.state.il.us.

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REINVENTING RURAL ZONING

by Joel S. Russell

It is a familiar scene, played out every night of the week at planning board meetings throughout the Northeast. An "out-of-town developer" presents a plan to build 49 houses (or 249 condominiums) on a beautiful farm miles away from any village or town center.

The volunteer board of the small town doesn't like it. The developer says, "Look, your zoning calls for two-acre lots and the average lot size in this subdivision is actually 2.8 acres. What more can you want?" Board members look down and think to themselves, "We want you to go away and leave us alone."

The board does not know what to do. Finally, one member rescues the others by saying, "We need more information about the effects on the water table and traffic and the school system." They send the developer away to bring them more paperwork, when they would really prefer just to send the developer away. The process cranks on, with the developer pushing the board and the board stalling the developer. Oftentimes, litigation results.

This is an interesting change in procedure from what occurred ten or twenty years ago. In those days, developers pretty much got what they wanted, quickly, from boards that looked upon development as "progress," adding jobs and tax ratables to their communities. But times have changed. The developments approved in the 1960s and 70s have generated traffic congestion, altered community character, and added more costs in municipal services than they brought in through increased tax revenues. "Progress" has resulted in higher taxes and a deteriorating quality of life in many places.

Many of the new residents who moved into these new developments are among the most vociferous now about controlling new development. They want to keep what remains of the bucolic character of their communities. And they have begun to sit on the boards that make decisions about development. Would-be developers say these residents want to pull up the drawbridge now that they have their little piece of the country. The residents say they want to protect the "rural character" of their communities from the depredations of developers who would ruin their communities.

This article explains how current zoning laws are largely responsible for these "development wars," and looks at how they might be changed to produce results that are more appropriate for rural communities.

The Failure of Conventional Zoning

The standoff between development and preservation is based upon a massive failure of local communities to regulate land use appropriately. Planning boards are simply helpless against developers when they apply their zoning laws and subdivision regulations, because these regulations essentially give the developers the right, if not the mandate, to turn the countryside into a suburb. Legally, planning boards do not have the prerogative to reject projects just because they are inappropriate for the community. If the developer complies with the letter and spirit of the zoning law and other applicable regulations, he or she has a right to develop.

Planning boards have, however, become very adept at stalling developers procedurally, by constantly demanding more information before they make a decision. Since the boards cannot legally say "no," they have learned to say "not yet" or "not until you answer 45 more questions," until the developer wishes they had just said "no" to begin with. It would be better if we had a system that allowed planning boards to "just say no" to projects that do not belong in the countryside.

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The problem is not with the planning boards or with the developers, but with the regulations that prescribe wall-to-wall suburban development. If you follow a recipe for mutton stew, you will not end up with chocolate cake. The standard zoning laws and subdivision regulations are a recipe for suburbanization, and that is what they produce: large-scale monotonous residential subdivisions that obliterate the varied rural landscape, punctuated by sterile shopping malls and office parks, all connected together by a massive network of pavement with immense parking lots.

It is not surprising that this is the case. Most zoning laws were adopted in the days when any kind of development was viewed as desirable, before the consequences of such development hit home. And these zoning laws were copied from those used as blueprints for places like Levittown. The purpose of such zoning laws is to encourage a standardized form of development as quickly and efficiently as possible, treating all land as identical. If there is unusual topography, vegetation, wetlands, or whatever, a bulldozer (or blasting) can solve "the problem." The governing ideal is standardization, meeting the needs of the automobile for parking and roadways. Old-fashioned hamlet centers and villages, which give communities a center and a unique sense of place, are illegal under most zoning schemes.

Many towns adopted one-acre zoning on the theory that one acre is about as much land as anyone needs for a house. That may be so, but one-acre zoning, as conventionally practiced, also means that every acre in town will eventually be developed uniformly. So towns then went to two-, three-, four-, and five-acre zoning to "preserve rural character." This effort has been little more than a cruel joke on people with moderate incomes. More land gets bulldozed and more road must be built for each house, people have more yard than they know what to do with, and suddenly land and house prices go through the roof. Large lot zoning has done little or nothing to preserve the land, because it has occurred in the conventional zoning context: uniform development of the entire landscape.

Zoning as a land use technique was introduced by civil engineer Herbert Hoover before he became President. It is probably his most lasting legacy (after all, we eventually recovered from the Great Depression). Designed originally to spur standardized development in cities, it has had its greatest impact in the development of suburbs, resulting in the familiar pattern of extensive, uniform residential subdivisions and shopping strips. The goal of developing every square foot of land is dubious enough in the urban and suburban context; it is absurd in rural areas.

Another hallmark of zoning, strict separation of different uses, may have had some relevance to cities and suburbs, where it is important to avoid putting glue factories next to apartment houses. In the rural context, however, it is a stifling restraint on the traditional freedom of country people to do what they want on their land.

What is important is not the use, whether it is farming, office, carpentry, craft industry, computer programming, or a residence, but the *scale* and the *impact* of the use on the surrounding area. In rural areas, almost any activity that can fit into a garage or barn can be done in a way that has little impact on the neighbors, especially if the nearest neighbor is a quarter of a mile away. And it is far better to have these small businesses and industries scattered around the countryside than concentrated in the expensive and ugly commercial strips and office/industrial parks that have degraded formerly scenic roads.

It is slowly dawning on transplanted urbanites and suburbanites that the initial resistance felt by long-time rural residents toward conventional zoning may have been well-founded. Zoning is a "big-city" concept that must be turned upside down if it is to serve rural areas. And a quiet revolution in zoning is beginning to occur, thanks largely to some original thinking by creative local residents who resist the conventional wisdom propounded by their engineering, legal, and planning consultants.

As conventionally practiced, zoning is wholly inappropriate to rural and semi-rural communities. Their "master plans," advisory documents that do not have the force of law in most states, usually contradict the zoning blueprint. The master plans call for focusing limited growth in existing population centers, keeping commercial growth downtown, and maintaining the rural undeveloped character of the countryside. The zoning laws, which are binding upon developers and planning boards, mandate the wholesale conversion of the countryside to residential subdivisions and prescribe strip commercial development along major roadways, outside of the downtowns.

This contradiction between the master plan and zoning law seems to go almost entirely unnoticed. Maybe this is because people don't read the master plan. Or maybe it is because people view it the way they view ideal human virtue: much to be desired but basically unattainable. Another explanation is that town boards fear litigation from developers if they explicitly limit large-scale development in the countryside.

Master plans are an articulation of the community's goals. Zoning laws are the application of these goals to the sometimes conflicting claims of private property rights. Generally, the claims of property rights prevail. This is why master plans say that agricultural land should be preserved, but the zoning laws that are supposed to implement them allow cookie-cutter development instead. Town boards do not want to confiscate a farmer's retirement fund. *And they are unaware that land value can be maintained without prescribing wholesale development of the countryside.*

So the farmer sells the farm to a developer and the scene described at the beginning of this article ensues. Does the system have to work this way? Are there other ways to regulate and use land so that the rural, agricultural, and natural character of the countryside can be maintained without confiscatory regulation? Is costly public land acquisition the only alternative?

The Revolution in Land Use Law

In a pathbreaking law review article, "Law and a New Land Ethic" (74 Minnesota Law Review 339 (1989)), Pace University Law Professor John Humbach traces the evolution in our nation's values from frontier days, when taming and developing the boundless wilds of a new continent was a national priority, to the emerging consensus that we are stewards and caretakers of an ecologically fragile planet with limited natural resources. He shows how earlier legal doctrines evolved to encourage private exploitation of nature by sanctifying private property rights, and how they have been modified in recent years to foster protection of the environment.

The most important aspect of Professor Humbach's article is his analysis of the so-called "takings" clause of the U. S. Constitution. This is the basis of the argument that developers' lawyers use to claim that restrictions on development are unconstitutional because they "take away" an owner's property rights without compensation. It is well-settled in the law that in order to prove a taking a developer must show either that a land use regulation does not serve a valid public purpose (preservation of farmland or environmental resources are considered public purposes) or that it deprives the owner of *any* economically viable use of the property.

This means that, in general, if a landowner can derive a reasonable return from farming a large parcel or from selling it for a single homesite, a zoning law precluding development of the property is constitutional. And even if such a law is found to deprive the owner of any economically viable use of the property, the problem may be able to be cured by a minor variance (such as allowing the construction of two or three houses instead of only one), rather than allowing full-scale development of the entire parcel. Humbach proposes that a zoning scheme that restricts land to its current use ("existing use" zoning), if properly supported by a master plan, would be constitutional.

A recent U. S. Supreme Court decision, *Nollan v. California Coastal Commission*, adds an additional ground to establish a taking: even if the regulation serves a valid purpose and the owner is left with an economically viable use of his property, there must be a valid connection (*nexus* requirement) between the regulation's purpose and its means of achieving that purpose. For example, if a community passes a regulation to protect its farmland from development, it cannot as part of that regulation require a would-be developer to provide public access to his property, since public access is not a means of preserving farmland. It can, however, directly preclude development of the farmland. McHenry County, Illinois, near Chicago, successfully defended a court challenge to a zoning law that put its best farmland into 160-acre zoning.

If Humbach's analysis is correct, and even many developers' lawyers concede that his basic analysis of the law of takings is sound, then it is legally possible to zone rural areas in a manner similar to Europe, permitting no development in the countryside except in connection with current uses such as agriculture and forestry. This does not answer the question of whether such zoning is fair, desirable, or politically feasible, however. It does open the door to creative experiments in land use regulation to test the fairness and political feasibility of innovative zoning reforms.

One common objection to low-density zoning in rural areas is that it may be considered "exclusionary." The concept of exclusionary zoning involves the municipality as a whole, where no provision is made to accommodate people of low and moderate income. As long as appropriate portions of town are zoned for small lots and multi-family development, the town's zoning is not exclusionary, no matter how little development is permitted in the most rural areas.

Zoning that is truly adapted to rural regions would solve, not create, affordability problems. It would permit inexpensive employee housing on large properties. It would also allow for the creation of small lots, as long as overall density guidelines are followed. Multi-family housing could be permitted in areas where such housing would not significantly impact neighbors or the environment. Allowing small-scale businesses to operate in the countryside would make it possible for people to afford to live in these areas because they could earn their living on their home property. By channelling most development to more intensive mixed-use settlements, true rural zoning would reduce the per unit cost of housing. In addition, it would allow families to survive with only one car, effectively increasing their incomes by \$4,000 to \$6,000 per year.

A New Generation of Rural Zoning Laws

Many towns have realized that their current zoning laws are not working. Most of the proposed solutions offered, however, do not reach to the heart of the problem. This is because of the widely-held assumption that interfering with a property owner's right to a conventional suburban subdivision would be illegal, subjecting the town to costly litigation.

Instead of drastically reducing rural densities, these zoning revisions merely increase minimum lot sizes to two to five acres. Sometimes these revised laws become more restrictive than ever with respect to non-residential uses, leaving rural landowners with no economically profitable use of their properties other than subdivision. The current wave of zoning revisions also tends to freeze the development of hamlets and villages, where mixed use growth should be encouraged, by restricting commercial use and requiring larger lots.

Other changes in zoning offer more hope. These include much lower overall densities in rural areas, smaller minimum lot sizes, increased use of clustering, designation of preservation overlay zones where

protective regulations apply, and hamlet zones that allow higher density and mixed uses that satisfy aesthetic and performance criteria.

If it is legally possible to keep development within defined settlement areas, then zoning reforms can go much further than they have so far. Of course, this will not happen unless such reforms are also perceived as fair to rural landowners.

Local lawmakers have generally assumed, incorrectly, that the Constitution safeguards a landowner's "development rights." If the Constitution actually protects only the right to an economically viable use, then most of the valuable development rights conferred by zoning can also be taken away by zoning. Limiting environmentally sensitive rural land to, say, one house per 100 acres, or allowing residential construction only by special permit or variance may be legal in some areas. But such restrictions may still seem to be an unfair deprivation of a property owner's economic value. When this is the case, the outer limits on land use regulation become ethical and political, not legal.

This opens the door to a far wider range of options. It means that town boards can ask the question "Is the proposed regulation fair?" instead of "Will we get sued?" It turns out that restrictive zoning does not always have the negative impacts on property value that people fear. Often, the most restrictive zoning results in the highest property values. In the prestigious Millbrook, New York hunt country, landowners use voluntary conservation easements to restrict their land to fifty acres per residence. They have seen their property values rise to the highest levels in rural Dutchess County.

If the scope of non-residential uses in the countryside is expanded, with limitations on size and impact, then landowners will have economically attractive alternatives to large-scale residential development. Fair solutions can be crafted, involving more flexibility of uses, carefully sited low-density development, cluster development, and the construction of mixed-use new hamlets. These will not occur, however, if the developer's path of least resistance and highest profit remains conventional suburban subdivision.

These new approaches will only work if we move away from the notion that the right to suburbanize the country is constitutionally protected. If towns stop allowing developers to use the U. S. Constitution as a club, they can begin to negotiate for the type of development and/or preservation they want. The place to start is with zoning ordinances that practice what rural master plans preach: preservation of the countryside and development of villages. Unless the new generation of rural zoning laws abandons the suburban models that have been used previously, we will only get large-lot suburban "supersprawl," not a settlement pattern that meets the needs of rural communities.

Zoning Reform in the Town of Washington

I have had the privilege of working with the Town of Washington in Dutchess County, New York on a zoning law that goes as far as any I have seen in changing business as usual in rural zoning. The success of this new law, passed at the end of 1989, is beginning to show. Two major subdivisions in remote rural areas, originally proposed for twenty-four lots and seventy lots respectively, have been scaled down to seven and eleven lots, with restrictions against future subdivision.

The Town of Washington is a doughnut-shaped rural town fifteen miles northeast of Poughkeepsie, with the Village of Millbrook in the center. It is composed largely of estate farms and small-scale residential developments. For years it has had the highest rural land values in the area because of both the prestige associated with it and the highly restrictive zoning which helped maintain property values. It is one of the best examples in the region of a town that has chosen to remain rural while successfully channelling intensive development into its village center, Millbrook, where water, sewer, transportation, shopping, and other

services are available.

An opinion survey conducted in connection with a 1987 Master Plan revision showed that the Town of Washington clearly desires to keep the countryside undeveloped while allowing intensive development in the core Village of Millbrook, a separate municipality with its own complementary zoning regulations. The Town's old zoning, passed in 1971, would have allowed cookie-cutter subdivisions of one-, two-, five-, and ten-acre lots, as well as a limited amount of strip commercial and industrial development. While more restrictive than any other town's zoning in the area, this zoning law allowed a type of development that would have turned the Town into an exclusive suburb of large homes on extra-large lots, destroying the rural sense of place and undermining the Village's efforts to maintain a vital commercial and residential core.

The new zoning law rezones much of the land that was in five-acre zoning to ten-acre. Over two-thirds of the Town is now zoned ten acres per unit. Much more important, however, is that the new subdivision regulations make an important distinction between *lot size* and *density*.

If all of the Town were to develop as ten-acre lots, the result would be disastrous. Instead of prescribing ten-acre lots, ten acres per unit is the basic *density* that must be maintained in the countryside. However, the Planning Board can require that residential lots be much smaller in order to protect stretches of contiguous farmland, forests and wetlands.

By uncoupling lot size and density, low densities can be maintained while lot sizes are kept small. Technically, the mechanism for doing this is often called "clustering." This term is usually avoided because it conjures up images of suburban townhouse developments or the Bronx. Most examples of clustering have not fulfilled the true promise of this technique. Many towns now allow clustering, and several also give the planning board the power to mandate clustering. In practice, however, clustering has not yet been successful in producing a pattern of development that fits well into the rural landscape.

Washington's regulations set clear guidelines for when clustering should be required and how it should accomplish its primary goal of land preservation. Land set aside as open space must be protected by perpetual conservation easements so that it can never be rezoned for development in the future. The regulations encourage the land to be owned and used by private farmers, rather than being placed in the cumbersome and inexperienced hands of a homeowners' association. A private farmer who needs to sell off a couple of lots can do this by selling lots of less than one acre, as long as he agrees to preserve farmland in an amount sufficient to maintain the overall density of the district. In this way, he may be able to keep farming, and not have to sell out to a developer.


The clustering technique is used to implement agricultural and aquifer preservation "overlay zones," areas found to be important to protect. The regulations require that development be clustered away from these mapped areas in order to preserve them. A set of visual resource protection guidelines also affects the siting of new development. Frequently the areas designated for preservation, such as scenic farmland, are also the best development sites. When this occurs, mandated clustering can reduce the value of the land. In order to mitigate this negative economic impact, a 25% density bonus is available for a cluster subdivision. Even when subdivisions are not clustered, the Planning Board is still empowered to require perpetual conservation easements to protect identified environmental resources as part of the subdivision process.

Clustering is an effective way to keep large developments from destroying open space resources. Even better, however, are incentives or requirements that discourage or prevent large-scale housing development altogether, such as "conservation density subdivisions." Under the conservation density provisions of the

Washington zoning law, landowners who agree to restrict their land to one-fifth of the allowable density under the zoning are allowed to use private, narrow gravel roads instead of the wide, paved town roads normally required. This provides an incentive to do very low-density subdivision, since the cost of building town roads is often a major economic force driving a landowner to maximize his lot count. Any landowner who voluntarily agrees to limit density to the one-fifth level is also relieved of having to comply with other lot dimension requirements, such as minimum road frontage. Since the minimum town road frontage for a conventional subdivision is 400 feet in the ten-acre zone, allowing gravel roads with smaller frontage provides a strong incentive to avoid conventional subdivisions and their associated road costs. The only two large subdivisions proposed since the zoning passed, covering tracts of approximately 500 acres each, have been conservation density subdivisions of seven and eleven lots.

The subdivision regulations also encourage the use of rear or "flag" lots on a limited basis, provided that the lots are spaced far enough apart and that they are at least 150% of the minimum lot size in the zone. This also encourages preservation of large tracts and discourages the construction of large-scale subdivision roads.

Several other Dutchess County towns have adopted conservation density provisions. Variations on it are also found in western Connecticut. The Town of Philipstown in Putnam County, New York has used the private road principle for many years through the "open development area" technique provided in New York State law. These techniques discourage the conventional suburban subdivisions that would otherwise be developed. There is no reason a town could not go one step further and simply outlaw conventional subdivisions in rural areas. Washington comes close to doing this by giving its Planning Board the power to mandate clustering and offering the conservation density subdivision as an attractive alternative to conventional subdivisions.



The Washington zoning law has another innovative provision enabling the town to designate "Environmental Protection" (EP) Districts. These are areas with special environmental qualities for which a customized set of rules can be written to do whatever is necessary to protect them. In order to implement an EP District a parcel would have to be rezoned based on a detailed study of the area, involving public hearings and full environmental review.

The agricultural preservation overlay zone, in addition to requiring clustering to protect farmland, allows farmers much greater flexibility in operating their businesses than they would have under conventional zoning. For example, farm owners are allowed to build employee housing and run farm-related businesses, such as food processing, equipment sales and service, and manure composting. This is not allowed in many towns, forcing farmers to sell to developers because they cannot house workers or run related retail businesses that enable them to make ends meet. If we want to keep farmers on the land, we must not prevent them from doing what they need to do to earn a decent living.

Washington's agricultural overlay zone is only a small step toward deregulating private small business in the countryside. Many farm families need to be able to run *unrelated* businesses on their properties as well. Family members may want to have an antique shop or car repair operation on their properties to supplement unpredictable farm income. If such businesses harm no one, and are small in scale, why not permit them under careful guidelines? Allowing more freedom for small business enterprises will enable rural landowners to have an "economically viable" use without having to sell out for large-scale development.

The Washington zoning law is very flexible in relation to home occupations. This allows very small businesses to operate out of houses in residential and agricultural areas, enabling people with young children to work at home, reducing automobile commuting. If these home-based businesses become more successful, however, they need to relocate to commercial areas. This is understandable in suburban neighborhoods, but

in rural areas it would seem to make more sense to allow them to expand where they are, as long as this expansion does not bother anyone. This would be preferable to forcing them into out-of-town office parks, industrial parks, or commercial strips. It would also reduce the demand for these often unsightly commercial developments.

The one commercial area in the Town of Washington, the hamlet of Mabbettville, has been designated a mixed use hamlet, encouraging the lively combination of residential, office, commercial and craft uses that is common in traditional hamlets and villages, but which is illegal under conventional single-use zoning schemes. Members of the Village of Millbrook Planning Board, fearing that Mabbettville would attract strip development that would compete with and damage business in the Village, asked the Town to reconsider the commercial designation. Working together, the Town and Village agreed upon a compromise that allows appropriate small business uses in Mabbettville, under careful guidelines that include a required balance between residential and non-residential uses.

The most important controls include strict design standards for Mabbettville to assure that it retains the character of a traditional hamlet, a limit of a 5,000 square foot "footprint" for non-residential buildings, and a requirement that parking be located on the street or in the rear. These provisions will mitigate the impact on the Village by eliminating most of the competitive advantages the out-of-town Mabbettville location would otherwise have. The pattern of development will be based upon a traditional village mixed use model, not a suburban strip with massive single-use buildings with a sea of parking in front.

How will these and other changes in Washington's zoning affect the "business as usual" scenario that opened this article? Well, for one thing, the new Washington zoning sends an unmistakable warning signal to prospective developers of the countryside. The preservation overlay zones, low density, scenic preservation guidelines, and mandatory cluster provisions give the Planning Board significant leverage in shaping development. Since Washington land prices are higher than those of surrounding towns, economically rational developers will probably choose to develop where land prices are lower and approvals for large-scale development are easier.

★ Smart developers may realize that these zoning protections will have the result of making lots that are approved extremely valuable, because they will be located in a setting that will retain its rural character. Siting restrictions and low densities may be worth accepting in order to take advantage of the opportunity to use private roads and produce a high-value, exemplary product. If they propose subdivisions at one-fifth the allowable density, with conservation easements to protect open land, chances are the Planning Board will be quite receptive. If they bring in conventional subdivisions, the Planning Board, if advised by a competent professional, will be able to redesign the subdivision so that it fits into the landscape.

More likely, however, landowners will not sell to developers at all. They will keep their land in large parcels and sell to the existing prestige market for estate farms. By assuring that the area will remain rural, land values will remain higher for intact large parcels than for development. By allowing landowners more flexibility in using their land for farming and related businesses, the zoning will encourage these businesses to continue so that owners will not have to sell. Far from devaluing land, this type of zoning increases values while simultaneously discouraging development.

Most developers will do what the Planning Board *really* wants. They will stay home or go to other towns where the regulations are more hospitable to large-scale development. Washington has thus rewritten the "invitation" to development so that instead of calling for the usual suburban pattern of development, it requires protection of the countryside and development in the village and hamlet centers. A new breed of developers who want to do traditional village development, but who have been frustrated by conventional suburban zoning laws, may find Washington's Mabbettville hamlet an inviting place to work.

Conclusions

Washington's "estate market" approach may not work in towns that do not have a tradition of estate ownership and strict regulation. In other towns it may be necessary to allow more flexibility for small-scale business uses, to promote the construction of clustered mixed-use hamlets, or to transfer development rights. Each town is unique, and each must find its own answer to preserving the countryside while being fair to current landowners.

The Town of Washington is not alone in making significant innovations in land use regulations. Many of the techniques discussed above have been used in other towns. As communities realize that conventional zoning ill-serves their purposes, they have begun to seek new and different solutions. A Town Supervisor in northern Westchester County told me recently that he thought in a few years conventional zoning would be a relic of the past.

* The fact is that we have not even scratched the surface of what is possible to do to protect our rural areas. Although the full details of a new approach to rural land use regulation will be worked out in the future, the basic principles are that rural zoning laws should:

- Prohibit large-scale subdivision and commercial development in the countryside.
- Encourage intensive, mixed-use developments following a traditional village pattern in existing villages, hamlets, and in areas designated to be "new villages."
- Allow a wide range of small-scale economic activities in the countryside so that landowners can use their land productively for farming and other worthwhile pursuits, provided that they do not harm their neighbors.

The Town of Washington has gone part way toward fulfilling the first two principles. The third one is still not generally accepted. People understandably fear that deregulating the countryside could produce the very problems zoning was supposed to prevent. But zoning created a new problem: instead of curbing nuisance land uses as intended, it spurred wholesale destruction of the countryside, making large-scale development appear to be the only economic alternative to traditional farming.

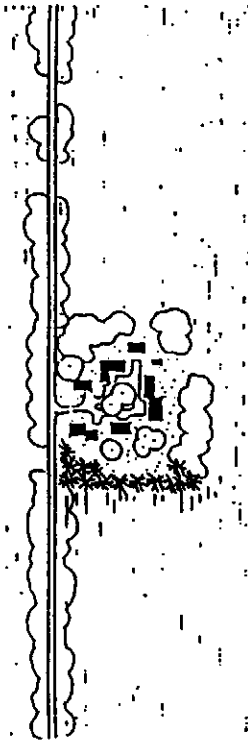
If large-scale development is to be successfully channelled only into appropriate areas, we need to zone these areas to allow it. At the same time, we must prohibit, rather than mandate, suburbanization of the countryside. [And we must give rural landowners freedom, within reasonable guidelines, to make economically productive uses of rural land. This will rejuvenate our rural and urban areas, and help maintain a true "working landscape." To deal with real or perceived economic injustices created by these measures, it may also be necessary to introduce a compensating scheme such as transferable development rights.]

By using land use regulatory powers appropriately, we can create the rural future we truly want, not the one inexorably charted for us by our misdirected zoning laws. Much of the northeastern United States still has landscapes and natural areas well worth preserving. If we act now, we can maintain these places for future generations and avoid the mistakes that have resulted from applying blueprints for suburbs to our rural countryside.

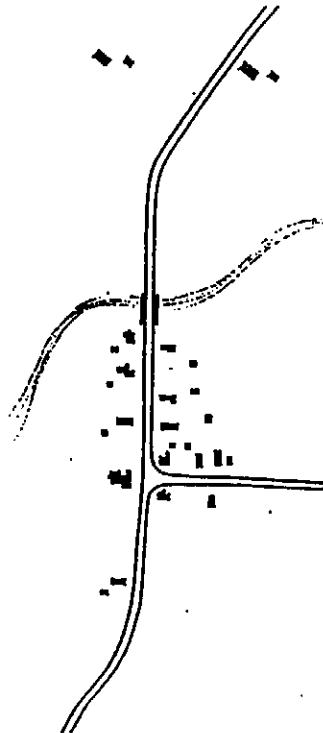
August 1991

NOTE: The Town of Washington's zoning law and subdivision regulations are available from the Town Clerk, Town of Washington, P.O. Box 667, Millbrook, NY 12545, (914) 677-3419.

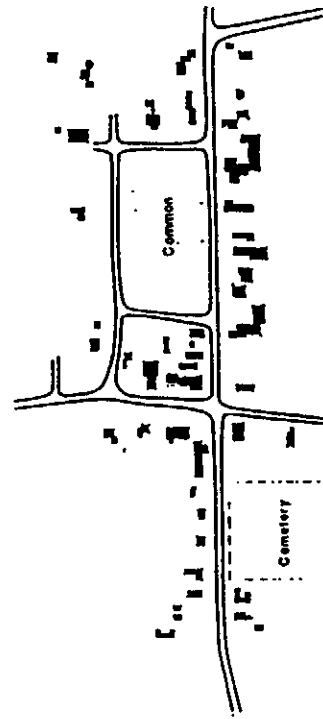
Mary Alex, town Clerk



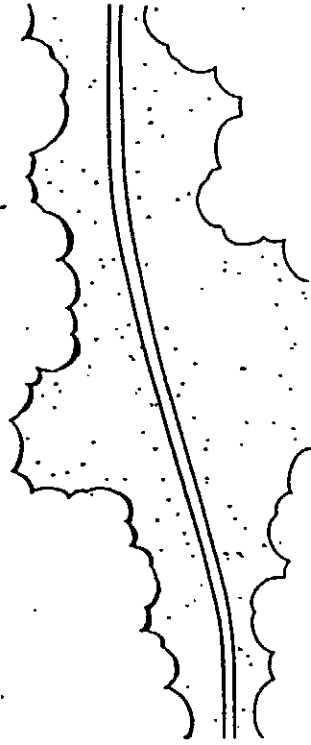
Farmstead Cluster: Small groupings of less than 10 buildings arranged in the pattern of traditional rambling farmsteads.



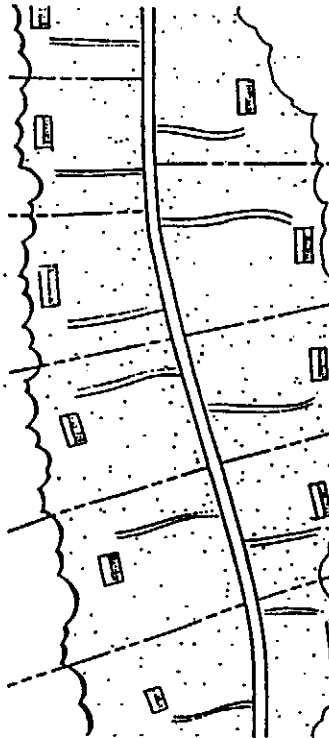
Rural Hamlet: Small town pattern of 10-20 buildings with close relationship to road and each other. Hamlet surrounded by protected open space.



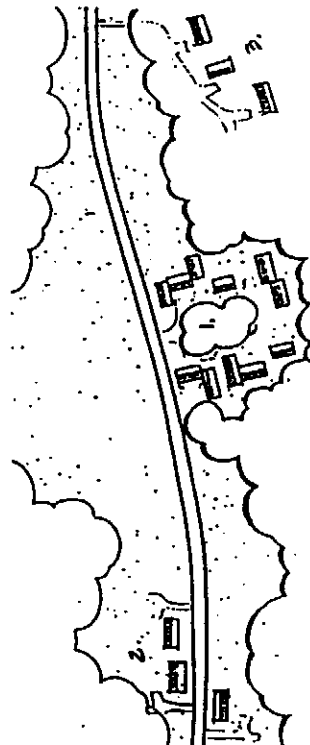
Village Centers: Village pattern of 30 to 120 dwellings, a variety of building types located close to roads, each other and the central common. Village surrounded by protected open space.



Existing: Road passing through a mix of woods and open meadows.

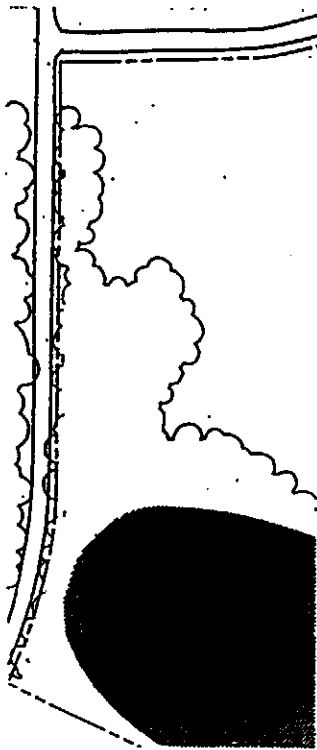


Not Recommended: Repetitive pattern of lots with identical houses sited monotonously in the open middle ground.

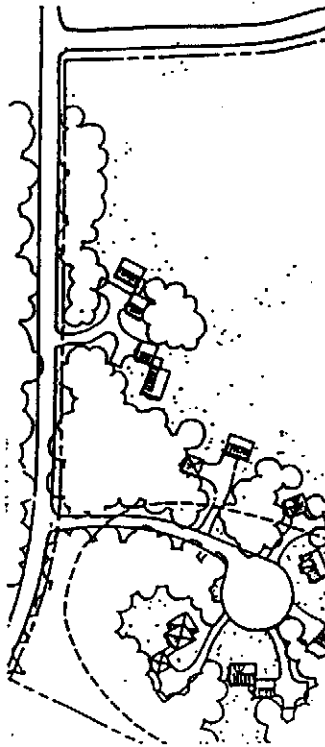


Recommended: Three recommended sited alternatives: 1) cluster, 2) detached with historical relationship close to road leaving adjacent open space, 3) well back from road on a common drive, screened from view by woodland buffer. Use of all three alternatives creates dynamic contrast between built areas and preserved open spaces. Siting approaches can be used either singly or in combination.

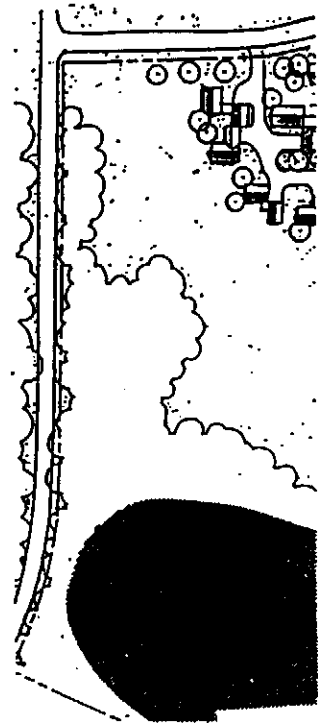
Site Planning and Design
Sensitive Woodland Preservation



Existing: Sensitive environment of old-growth timber and mature woodlands providing important wildlife habitat, shade and oxygen. Field is marginal farmland.

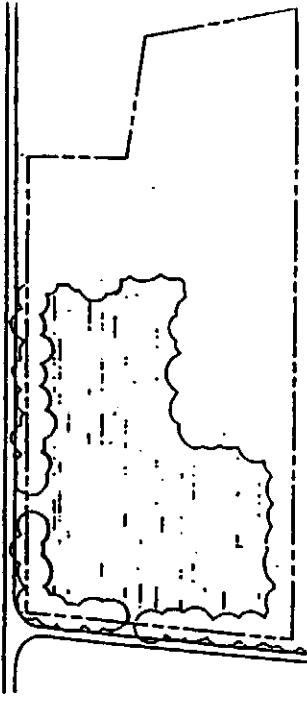


Not Recommended: Development destroys valuable woodland ecotone and wildlife habitat.

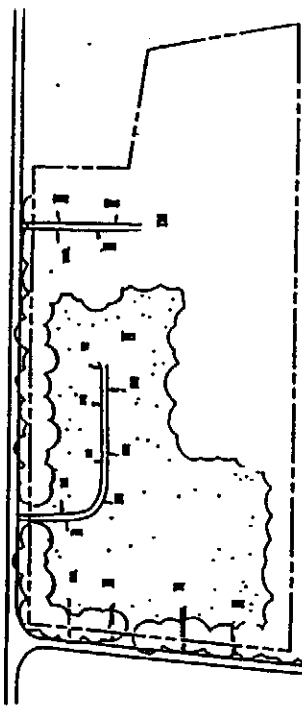


Recommended: Limited developed is located at the edge of the field along the road in a traditional farmstead cluster leaving both preserved woodland and as much of the remaining field as possible.

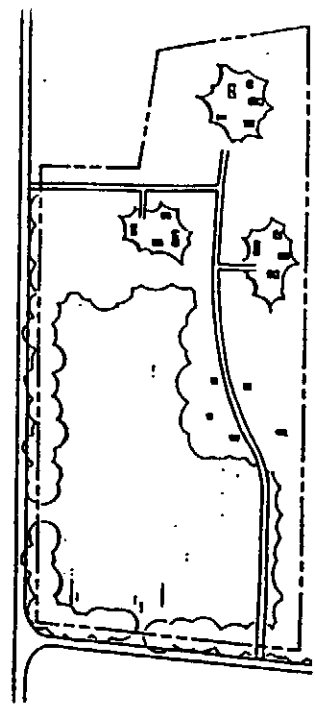
Site Planning and Design
Farmland Preservation



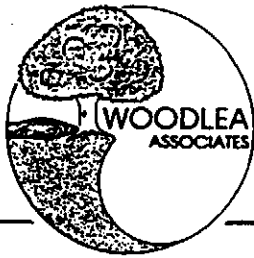
Existing: Open tilled field and second growth woodland.



Not Recommended: Housing scattered along the road and in the open field.



Recommended: Agricultural land is preserved while housing is placed in the second growth woods.



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PRINCIPLES OF RURAL ZONING

BY JOEL S. RUSSELL

A good zoning law should do three things:

- *Protect what is important to a community, while encouraging needed development that fits into the community.*
- *Offer a streamlined review process for small-scale development.*
- *Provide for thorough, comprehensive, and efficient review of large projects.*

THE PRINCIPLES

The basic principles of rural zoning are as follows:

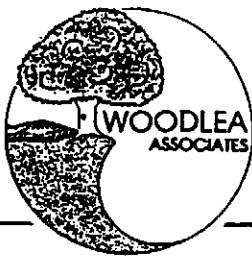
1. **Impact is more important than use.** Rural zoning should permit a wide variety of uses, but subject them to "performance standards" which are used by the Planning Board or Zoning Board of Appeals to determine whether or not a use should be allowed by a special use permit in a particular location. This maintains the sound rural tradition that landowners have flexibility in land use, as long as they do not negatively affect their neighbors or the town. With a choice of uses, landowners can make a living on their land without having to resort to residential development. Neighbors should have a significant opportunity to affect the uses around them by participating in an informal mediation process, as well as in formal and informal hearings.
2. **Density is more important than lot size.** Most conventional zoning determines the number of units allowed on a parcel by setting minimum lot dimensions for each district, and then making the owner prove how many lots can fit on the parcel. This leads to suburban-style subdivisions with uniform lots that permanently alter the character of a rural area by increasing its population and changing the landscape. Although areas that are not designated for intensive hamlet development need to maintain low densities, they do not need to have large minimum lot sizes. Large lots simply consume the landscape faster than small lots. Therefore, rural zoning should separate density from lot size, allowing very small lots as long as overall density guidelines are maintained.
3. **Design is more important than density.** The impact of development and its profitability for the landowner are not simply a "numbers game." Attractive, well-planned low density developments are often more profitable than high-density ones. Well-planned high-density developments may fit in better with the town's character than low-density "sprawl" development. Good design and flexible planning are often more important than density to both the landowner's bottom line and a town's attractiveness.

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from National Rural 91 Workbook

4. The countryside should remain largely undeveloped, but not at the expense of the land's economic value. By allowing a range of uses in the rural areas, landowners can make a living on their land. If they choose to develop the land, they should have several options for compatible development. This enables a town to fulfill its goal of preservation of rural land, while allowing a fair return to the landowner. Rural zoning should contain incentives for keeping private land undeveloped, such as density bonuses, the use of unpaved private roads, and the option of selling development rights for use in other areas. Non-zoning incentives might include leasing development rights to help offset property taxes on rural land.
5. Development should be concentrated in and near existing hamlet centers, following the traditional pattern and layout of the hamlets. Significantly higher densities should be allowed within these limited areas. Street and lot layout principles should establish how these areas are to develop so that they will maintain their traditional rural small-town feeling.
6. Development should meet design standards that maintain local community character. Back when everything was built by local contractors using local materials, towns had a consistent and special "look" and "feel" to them. Now that builders and developers, and the materials and architecture they use, come from all over the place, that distinctiveness of a place is gradually being lost to a standardized form of development found throughout suburban America. A rural zoning law should contain guidelines and plans for ensuring that new development is compatible, and does not create "Anywhere, USA."
7. Reviewing boards should have discretion to allow what fits into the community, to prohibit what does not, and to condition approvals to make sure that proposed development is appropriate. Instead of having rigid use and bulk requirements, the Zoning Board of Appeals and Planning Board should have the flexibility to work with applicants and neighbors to come up with plans that fit the town. They also should have the authority and resources to make sure that such plans are properly implemented.
8. Small-scale projects need less complicated review than large-scale ones. Elaborate review is necessary for complex projects, but there is no need to subject three-lot subdivisions or small shops to the same process as a major expansion of the village. However, even small-scale development should satisfy design principles to fit into the character of the community.
9. Zoning should be simple enough to understand, but adequate to fulfill its objectives. Rural zoning should be clear and flexible. Because it is different from conventional zoning, certain aspects of it may be more complex, however. For example, the calculation of allowable residential density in conventional zoning appears to be simple, based upon minimum lot sizes. However, the reality is that it requires the preparation of detailed and expensive engineering plans to determine how many lots will actually "lay out" on the land. These plans, in turn, must be reviewed, debated, and approved by the Planning Board before an owner really knows how many lots he can develop.

In one rural zoning law I have drafted, small projects (four lots or less) can be approved using a simple process similar to what is currently used. For larger projects, a special use permit is required and a mathematical formula determines the allowable number of units. This density formula is based upon important planning factors, such as the amount of unbuildable land on the site and the capability of the road system to absorb more traffic. It allows increased density for plans that fulfill town open space and affordable housing objectives. This zoning law is complex in ways that conventional zoning laws are not, in order to achieve better planning and design. On the other hand, it deletes many pages of rigid and detailed requirements for various uses that are better controlled case-by-case, using the sound discretion and common sense of town officials, landowners, and neighbors.



WOODLEA ASSOCIATES

RURAL ZONING vs. "CONVENTIONAL" ZONING

1. Conventional zoning is a blueprint for the uniform development of cities and suburbs.
 - Rigidly regulates use, density, lot size, and setbacks, and arbitrarily limits freedom of land use
 - Does not effectively control scale, impact, and design
 - "Mandatory sprawl" (or strip commercial development) *everywhere*
 - Separation of uses; uniform lot sizes
 - Highly engineered roads and sites; development obliterates the landscape
 - "Build-out" analysis shows the predictable result: destruction of rural character
 - Substantially increases cost of municipal services, especially for widening, straightening, and paving rural roads, greatly increasing property taxes
2. Conventional zoning conflicts with rural preservation goals and makes rural development patterns, such as traditional hamlets, illegal.
3. True rural zoning goes "against the grain" of conventional zoning.
 - Treats land as unique, not uniform
 - Controls scale, impact, and design more than type of use
 - Takes the best of what exists in rural areas and legalizes it
 - Is more flexible in allowing low-impact non-residential uses and varied lot dimensions
 - Preservation overlay zones *protect* resources (scenic, agricultural, watershed, *etc.*)
 - Uncouples density and lot size: small lots and very large parcels
 - Traditional mixed-use villages and hamlets; dense and designed
 - Limits commercial strips; retail in hamlets, other commercial uses dispersed
 - Allows appropriate commercial growth to enhance tax base
 - Unpaved country lanes; development blends into the landscape
 - Maintains low density rural road system, stabilizing tax rates
4. What you zone for is what you get, sooner or later.
5. If development is not carefully placed *somewhere*, it will end up *everywhere*.

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'Infill' may fill bill in bid to end sprawl

By **Stacie Oulton**

Denver Post Staff Writer

Mar. 5 - ARVADA - Often criticized for promoting sprawl, Arvada is trying to chart a new course.

For the first time, it is undertaking a major "infill" development in the Water Tower Project near Olde Town, where the city plans 800 or more lofts, apartments and townhomes on 26 acres near what is hoped one day to become part of the light rail network.

City planners across the country see infill development - taking existing property in the city's core and revitalizing it with new homes, offices and retail space - as a key to slowing suburban sprawl.

Talk of infill development is a sign that Denver has matured as a metro area. Spreading across the plains has given way to denser, more urban neighborhoods, planners say.

Density has its detractors

Yet the outcry against infill development can be as great as the complaint about sprawl.

"I think the best phrase I've ever heard is, 'I don't know what all this planning stuff is about. But I'm against sprawl and density,'" said Frank Gray, the community planning director for Lakewood, another suburb undertaking its first major infill development at West Colfax Avenue and Wadsworth Boulevard.

That sentiment often leaves cities struggling for answers in an atmosphere where residents want development to always be somewhere else.

That's a tough position to be in when the Denver Regional Council of Governments projects that nearly 1 million more people will move to the metro area during the next 20 years. That population boom threatens to spread the metro area beyond the 730 square miles in which the regional council hopes to contain it.

"There's a saying that the definition of madness is continuing to do the same thing, but expecting different results," said Bill Vidal, executive director of the regional council.

If the metro area's cities and counties continue the current trend of building on the outer ring, the regional council estimates it will cost \$4 billion in new roads, water and sewer systems in the next 20 years - all paid for by the same taxpayers who don't want sprawl or the alternative of increased housing densities.

"No change isn't an option," said Marya Morris, senior research associate with the American Planning Association.

What Arvada hopes to accomplish in the Water Tower Project is what Morris and other planners call new city centers, areas not reliant on the automobile for getting to work or stores. It's an attempt to build what many suburbs never have had - a focal point where a neighborhood comes together on foot and face-to-face.

"It's not just adding density, but it's creating a better community through architectural design, through better planning that there are places to go in the community, whether it's a community center or a retail area or being centered on a school," Morris said. "It's not just building houses closer together and having them (still) be auto-dependent." Best place to start

For Arvada officials there is no better place to start an infill project than Olde Town because it's close to a possible future rail line, yet still within a half-mile of Interstate 70. Olde Town already has both a quaint shopping district undergoing a revamping and a massive new development including a theater complex a short distance away.

Given that, Arvada City Manager Craig Kocian said, the success or failure of the Water Tower Project will serve as a harbinger of Arvada's future. Without such developments, traffic and commuting will only get worse.

"Every minute we add . . . is subtracted from the family, from house maintenance, from the Boy Scouts, from coaching," Kocian said. "The commute operates against communities." But then the city runs headlong into people such as Mike Arnold, who has lived for 23 years in the Water Tower area that Arvada wants to raze. He has two lots amounting to 1.5 acres, and nearly a half-acre is devoted to a garden used by the neighborhood.

"Forced from our homes" Given the real estate market, Arnold said he doesn't think he could find the same combination of land and house for less than \$450,000, and he doubts the city's renewal authority will pay him that much to take his property for the Water Tower Project.

"What they are striving for is a sense of community. There's some good points to that," Arnold said of the city's plans. "But I'm where the rubber hits the road. . . . We're being forced from our homes to build more homes."

The infill development that planners cite as smart growth is unavoidably borne on the backs of people, and planners don't have answers for how to deal with the human costs of redevelopment.

In Arvada and Lakewood, the areas targeted for infill are peppered with old-style suburban development: large lots that could accommodate horses, no sidewalks and some commercial businesses and apartments. Residents such as Arnold love the area because it provides modest affordable homes with a touch of a rural feel.

As the community cat scampers by, Arnold talks about the intimacy of the neighborhood where children gather to play at the house of his next-door neighbor, Roxie Sorrentino, who has an acre of land where he grows corn, peppers, squash and boards horses to supplement his pension. Sorrentino has lived in the house for 60 years.

Arnold, Sorrentino and a handful of other homeowners, along with several large apartment complexes, would be displaced by the new development, which would be home to up to 2,000 residents in the next few years.

"What about the old ruralism that was part of Arvada?" said Arnold, a landscape architect with a background in land planning. "We already have a community. All the things they are shooting for in new urbanism we have here." A different perspective

Although the city might consider sparing the row of houses that includes Arnold's and Sorrentino's, officials see the neighborhood differently. They say it's filled with substandard housing, apartments most people wouldn't want to live in, and a population that is highly transient. They also paint it as a high crime area.

Arvada's plans, they say, will replace the existing apartments with other affordable ones as well as higher-end lofts favored by urban professionals uninterested in yard work. It also won't significantly change the number of people living in the area.

"It's a great opportunity for doing some good things," said Councilwoman Lorraine Anderson.

The Water Tower Project will be a place to provide more people with better places to live, Kocian echoed.

Still, Arnold and city officials know that infill development won't stop suburban sprawl, although without it sprawl will be much worse.

"There will be low-density sprawl, and there is always going to be demand for that," Morris said.

Even so, planners say, it's imperative that something is done to blunt the increasing demand for fringe homebuilding, and it's not just to save the open space or view of the mountains on the outskirts.

"I'm looking at Downtown right now," Gray said one day from his Lakewood office. "And we're covered in a brown layer. Environmentally we can't afford it, socially we can't afford it, fiscally we can't afford to live that way" Gray added that without infill, the suburbs will remain the place where people connect only bumper-to-bumper.

"We - planners, cities and builders - have created a horrible environment socially," he said. "If you look at the houses built in the 1930s and the houses in the 1990s, it's striking." Homes of old were small on the inside and focused on the outside world with porches and detached garages. Current suburban development is marked by massive garages that "gobble up the streets," he said.

"The houses of the 1990s, they are mini-fortresses," he said. "You stay hermetically sealed." And that has come with a price.

"The social structure, the innerfaced, self-focused infrastructure we have created (in the suburbs) has created anti-social behavior. This insular lifestyle . . . created a great deal of anger because you can't relate socially," Gray said.

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Article by Stacie Oulton, Denver Post On-Line, May 5, 2000.
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Agronomy 896
Urbanization of Rural Landscapes
Article Review
Joel Connot
February 16, 2000

Feedlot counters \$40 million suit

Summary:

Adams Land and Cattle Feedlot south and east of Broken Bow, NE was in Custer County court this week. Adams Land and Cattle is the states largest cattle feeding operation, with the capacity to feed 100,000 cattle. The feedlot filed several motions to counter a \$40 million class-action lawsuit filed by local residents in December. The motions ask the plaintiffs to prove the charges in the complaint. Including one charge that states that all of the areas 4,000 residents claim the feedlots odor and dust are a nuisance and should be ordered to shut down. The defendants are asking for more definitive charges. In addition they are asking the plaintiffs to speak for themselves or additional parties. This would determine if the motions would continue as a class action suit or if designated parties would participate in the action. A hearing is scheduled for March 2, 2000.

Relevance:

The trend in American agriculture has been "bigger is better" since the very beginning. Agriculture is a constantly evolving business. In the past, it was a cottage industry today it is highly specialized. Since Monfort made the move to modern large-scale cattle feeding in the 1960's near Greeley, Colorado, complaints about this type of production have been mounting. Confinement livestock production is often attacked for several reasons, including animal rights violations and pollution of air and groundwater.

This issue is complicated for several reasons. First of all, technology and economic structure has allowed larger farms to develop. This large-scale development creates problems in efficient animal waste handling. The second part has two components. A smaller percentage of the population is making their living from livestock feeding. When raising cattle was the way of life for everyone, nobody could cast stones. One farm smelled like the rest. Anymore, with such a small number of agriculture producers, the neighbors are not as accepting.

One thing these groups of people need to consider before suing because of a little smell or some dusty conditions is the property rights of the farmers. If the cattle producing operation is obeying the laws and not operating recklessly, then it is their right to generate an income on their property. The best way to guard yourself against unwanted development near your home is own the land within a comfortable buffer. In today's society it is important to protect property owners rights. Owners of land should not be pressured to change their lifestyle because their neighbors don't like the way they make a living.

*A tough issue -
when people must
the rules, must
the must all
This opposition
what's the answer
Chuck*

There is a series of questions that should be answered before attempting to run off, bankrupt, or shutdown a legitimate business. The most important thing is to consider if your community can live without the good things that business provides. Consideration must also be given to the number of jobs and families that are supported by the operation. Many times, large feedlot operations in rural communities generate tax dollars. Operating a feedlot is not the most glamorous source of financial stability in a community, but I believe if it is the best industry you have going in an area you should go with it.

Source: Lincoln Journal Star, Saturday, February 12, 2000 page 2B

Feedlot counters \$40 million suit

Reprinted with permission
of The Associated Press

BROKEN BOW — A cattle feedlot company has filed several motions to counter a \$40 million class-action lawsuit filed by local residents in December.

Adams Land and Cattle Co. filed four motions this week challenging the lawsuit's 11 plaintiffs to prove charges in the Custer County District Court complaint.

The plaintiffs said they were speaking for all area residents in their lawsuit. They seek at least \$10,000 for each plaintiff named and for each of the about 4,000 residents who live in and around Broken Bow.

The lawsuit also asks for an injunction to close the Adams operation, which feeds more than 100,000 cattle in lots south and east of Broken Bow. The plaintiffs claim odors and dust from the operation are a nuisance to the residents.

Adams' motions ask the court for more definitive charges, further asking if the plaintiffs speak for themselves or additional parties. The motions also ask the court to determine if it should proceed as a class-action lawsuit and to designate what parties are involved in the action.

A hearing on the lawsuit is scheduled for March 2.

Midwest lawmakers: Cooperation needed to keep farmers on land

SIDNEY (AP) — Years of record low grain and livestock prices that have driven thousands of farmers off the land will continue unless collaborative action is taken, speakers at a Family Farm and Ranch Crisis Rally said.

"Either we cooperate together or we're dead," South Dakota state Sen. Frank Kloucek said Thursday.

Kloucek is keying efforts to enact similar laws in Midwestern states to help farmers and ranchers have an even playing field with multinational corporations.

Appearing with him at the rally were Nebraska state Sens. Cap Dierks of Ewing and Jerry Matzke of Sidney.

Kloucek advocated a concentrated effort among those in the agricultural community to write state and national lawmakers not only to stop the mergers of multinational companies, but to enforce existing anti-trust laws.

Matzke said much of the problem in enforcing existing laws related to jurisdiction. Enforcement of federal agricultural laws is left to the Department of Agriculture rather than to the Justice Department, he said.

Matzke contrasted the vigorous action taken by the Justice Department in its pursuit of Microsoft's alleged monopoly violations with inaction by the Agricultural Department against like actions by multinational food corporations.

Kloucek and Dierks, who have conducted similar meetings in four Midwestern states, said the only way to get the attention of the federal government was by making state legislators and state attorneys general aware of the problem.

Unity is also important, Dierks said. When he first introduced a livestock price reporting bill, he said, packers told him, "If you do this, Nebraska will become an island," meaning no packers would buy Nebraska cattle.

However, when similar legislation was passed in South Dakota, Minnesota and Iowa, he said, the packers capitulated and agreed to a federal law that had less bite than the individual state laws.

"It wasn't all we wanted, but it was a first step," Dierks said.

The senators also say imported beef needs to be labeled as such so consumers can choose whether to support foreign companies.

They also said packer contracts for livestock should be made a matter of public record and corporations should be banned from feeding and owning livestock.

C. A. Francis
Jan. 5, 2000

Summary: Consolidation of farms and ranches into ever-larger units has made it increasingly expensive, risky, and difficult for farmers to stay on the land. Family farmers are currently at a tremendous disadvantage compared to large corporations because they have difficulty purchasing inputs at the same price and often have to sell their commodity crops or livestock to the nearest buyer. Many argue that the playing field is not level. State legislators told a rally in Sidney that existing legislation could be used to fight the emerging monopolies in agriculture just the way they have challenged Microsoft. They argue for a more transparent system of pricing and buying that gives equal opportunities.

Relevance: Consolidation of farmlands and control of the input and marketing industries in agriculture have made it difficult for the family farmer to stay in business. Coupled with the pressure of land prices and taxes on farmland near cities, this has provided a great temptation for smaller farmers to sell their land to speculators or to create acreages for houses. In either case, the land is lost to agricultural production. Larger sized farms as what is perceived by many as the only way to survive in agriculture leads to a high level of discouragement among those potential young farmers who would like to enter the business. The state lawmakers agreed that they would have to cooperate in dealing with legislation to control or influence pricing policies and other regulations in agriculture, and that labeling of products was one way to inform customers about the source of their food. They said that outside corporations and farms owned by packers should be prohibited from feeding and owning livestock, because they create an unfair degree of control of both production and the marketing process.

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Agro 496

Urbanization of Rural Landscapes 3-1-2000

Ed Trouba

"Platte Levee Proposal Threatens Cabin Life"

This article about a proposed flood control project appeared in the February 13 edition of the Omaha World Herald. The project proposed by U. S. Army Corps of Engineers at a cost of \$19.3 million would improve levees and prevent flooding between Lincoln and Omaha. The levees would span a seven mile stretch.

At issue is 32 dwellings which would be sandwiched in by the levees. Options include raising the level of the dwellings-currently prohibited by Sarpy County zoning- or paying owners to remove them. The NRD is trying to pursue a third alternative by persuading the federal government to obtain easements from property owners whereby they agree to endure flooding without holding the government responsible.

Much of the article is devoted to the personal experiences and memories of the residents of the cabins during the past 40 or more years. The levee proposal and the objections of the owners illustrates the on going dilemma of attempts to improve the landscape, prevent flooding, and yet not destroy history and memories. The proposal by the NRD recommending easements seems to provide the best alternative to achieve all goals.

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Omaha World Herald

Platte Levee Proposal Threatens Cabin Life

A \$19.3 million flood-control plan may uproot some homes along the riverbanks

BY TODD COOPER
WORLD-HERALD STAFF WRITER

When Richard and Margaret Pietryga wander down to their cabin on the east bank of the Platte River, they're surrounded by serenity.

Water trickles from melting ice chunks in the middle of the river. Wind whistles through the leafless maples and cottonwoods. Blinding sunlight bounces off the islands of ice. And life moves as slowly as the sandy, silty river.

But after more than 50 years of "hunting, fishing and hanging out" on this bank, the Pietrygas are seeking a

different type of tranquility — from the government.

The U.S. Army Corps of Engineers and area agencies are considering a \$19.3 million plan that would improve levees along the Platte, and prevent flooding in the ice-jam-prone area between Omaha and Lincoln.

In the past few weeks, four area agencies have supported the study of a levee plan that they say would protect 8,000 acres of farmland and key infrastructure — Interstate 80, U.S. Highway 6, the Lincoln municipal water well system near Ashland, railroad tracks and communication cables.

The hope is that new 50-year flood levees would prevent floods such as the 1993 washout that broke the Western Sarpy County Dike and shut down U.S. Highway 6 and Interstate 80.

But in the process of trapping
See LEVEES Page 10



NOBUKO OYABU/THE WORLD-HERALD

RIVER VIEW: Richard and Margaret Pietryga and their children, including Dan, left, spend much of their spare time in their getaway along the Platte River.

LEVEES River Plan Threatens Cabin Life

Continued from Page 1

floodwaters, the levees also would sandwich several cabins and a few year-round homes in the floodway.

As a result, federal officials say, local agencies might have to remove or elevate about 32 dwellings, including the Pietrygas' modest cabin, on both banks of the river.

That could leave 32 families without their riverfront cabins and homes.

"We just want to be left alone," Pietryga said. "I've spent my life down here. I plan to spend my retirement down here. I want to enjoy it."

No final decisions have been made. However, officials from the Papio-Missouri River Natural Resources District and from Sarpy and Saunders Counties say the best option is to build a levee along each bank, beginning at U.S. Highway 6 and running north for seven miles.

In order to receive 65 percent of the project in federal funding — or about \$12.6 million — officials would have to ensure that the area cabins won't be more prone to flood damage.

That may mean either raising the cabins above the 100-year-flood level — which isn't allowed under Sarpy County's zoning laws — or paying the cabin owners to remove them.

"Ideally, we'd like to see them removed from the floodway," said Nelson Carpenter, who is managing the study of the area for the corps.

But local agencies insist it's not a foregone conclusion that the cabins will have to be removed. Steve Oltmans, general manager of the Papio-Missouri River NRD, said the NRD is going to do everything it can to persuade the federal government to allow officials to simply obtain easements from property owners. With easements, property owners agree to endure flooding without holding the government responsible.

Whether to remove the cabins won't be decided until the corps completes its study in three months, said Marlin Petermann, the NRD's assistant general manager.

"What we wanted to do is be upfront with the people that it may come down to moving the cabins," he said. "That's the worst-case scenario."

For the people who have lived and played along the banks of this sandy river, nothing could be worse. In many cases, their roots along the Platte are as deep as the river is shallow.

They agree the levees need to be built to protect the surrounding area, but they say the floodway never has overwhelmed their way of life.

Only a few people live year-round along the river. Many cabin dwellers have permanent homes elsewhere in the area, spending the flood-prone winters away from the Platte, and most of the dwellings are modest cabins, ranging from 340 to 1,600 square feet.

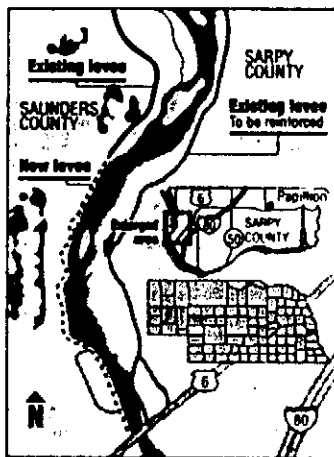
When the winter washouts strike — as they did in 1966, 1971, 1978 and

What's Next?

■ The Lower Platte North Natural Resources District, based in Wahoo, on Monday is expected to become the fifth agency to support study of new levees for the Platte River. It would join the boards of Sarpy and Saunders Counties, the Saunders County Drainage District and the Papio-Missouri River NRD.

■ An informational meeting on the proposed study is scheduled for 7 p.m. Tuesday at the Papio-Missouri NRD headquarters in the Chalco Hills Recreation Area, 8901 S. 154th St.

■ The U.S. Army Corps of Engineers will study the feasibility of the plan over the next three months. If the plan moves forward, it will be presented to Congress in December. If funded, construction could begin in 2002.



KAI WILKEN/THE WORLD-HERALD

most notably in 1993 — the dwellers simply wait for the water to subside, drive to their cabins and clean up. Most say they don't have flood insurance and don't try to collect damages.

"You can try to control the river," Pietryga said. "But you won't. You can't control it. You just live with it."

The Hruska family happily has lived with it ever since the late U.S. Sen. Roman Hruska purchased a cabin in 1941.

The rustic, two-room cabin on an island in the Platte has no electricity, plumbing or running water, save for the river that passes about 15 feet away.

Ryan Hruska, Roman's great-nephew, said his family purposely has kept the cabin primitive because of the potential flood risk. That way, there's less to flood — and less to fix.

On the door frame of their two-room cabin, the family has marked the major floods. By far, the highest is a line 6 feet up the frame, a mark from the 1993 flood.

But the winter watermarks are minor compared with the other milestones they've recorded at the cabin.

Hruska, 27, fondly remembers catching big fish — and hearing even bigger fish tales — alongside his dad

and great-uncle.

Hruska said he used to sit in the cabin and listen with wide-eyed wonder as his great-uncle and relatives would tell legends of catfish so big that they had to string "whole chickens" for bait and use tractors to pull the fish ashore.

As they grew, there were other, more serious moments: He got engaged to his wife, Kristi, in the cabin. Older brother Robert spent his honeymoon there. Sadly, his father unexpectedly died the morning of a planned duck hunt at the cabin.

And before his great-uncle died, the senator left a request: Conserve the cabin. Preserve the land. Maintain the memories.

"I have a 2-year-old son, Ryan Jr.," Hruska said. "Just mention the word 'cabin' and, already, his eyes light up and he can't wait to go. I just want to be able to pass on to him how much that place has meant to us."

There's no mistaking how much the river means to Pietryga.

Standing outside his 650-square-foot cabin, the 61-year-old proudly pulls out a picture from June 1954. In it, the skinny 16-year-old is holding two catfish that are as long as his legs. His father, Ed, and older brother Ted are standing beside him, beaming in their bathing suits.

Two years later, Pietryga's father died and his mother asked Pietryga to take care of the cabin.

Though he since has replaced the original cabin, which became a "rat trap" in its old age, Pietryga dutifully has kept the home-away-from-home on the same stretch of the Platte.

In his career as an engineer on the Union Pacific rails, Pietryga said, he didn't have much time or money for tropical resorts. So Richard and Marge spent "almost every spare moment" raising their daughter and three sons on the river.

Over the years, they've held fish fries for everyone they knew. Across the river, Pietryga and neighbor Wally Smith and their adult children have spent many weekends in their duck blinds, their camouflaged hats peeking out from the thick straw.

Both Pietryga and Smith, 64, have gotten their biggest catches down there. One of the Pietrygas' first dates, back in the 1950s, was at the river. They've been married 41 years. Likewise, Smith's youngest daughter, Christine, married the son of some river neighbors.

Now Smith, a former construction superintendent, and Pietryga simply want to be left alone to enjoy another milestone: their retirement.

"If I lost this place, I'd be hurt — I'd really be hurt," Pietryga said. "To me, the best idea is to build the levee and leave us be. We've handled the floods before. We'll be able to handle them again."

Agro 496

Urbanization of Rural Landscapes 2-16-2000

Ed Trouba

"It Keeps Coming, Coming, and Coming"

This article appeared in the January 23 edition of the Omaha World Herald. It says urbanization of rural land sweeps away signs of the last century in the Omaha area.

The writer first addresses what is a human interest story of a family owned farm which has been in the family for over 100 years and acquired by the current owners 45 years ago when they married. He then speculates on the size of Omaha based on the growth in progress.

The future of Omaha will depend on the pattern of growth it follows. These include historic development pattern with higher growth in surrounding communities, a larger suburbanized Omaha, or intensive development with high rises and downtown development.

The article then focuses on the future of jobs in Omaha. This poses a dilemma for urban planners and has divided them into two camps—those focusing on practical growth and those reaching for the area's potential growth rate. It also points out that drainage and the capacity of the sewer system are major determinants of an area's population capacity.

2-R

SUNDAY WORLD HERALD January 23, 2000



SARPY SPRAWL: Suburban housing sprouts across the road from Idora and Floyd Dickey's Sarpy County farmhouse, which will be razed soon to make way for another subdivision. How to direct Omaha's expansion is under debate by planning officials.

It Keeps Coming, Coming and Coming

Urbanization of rural areas sweeps away signs of the last century

BY CHRIS OLSON
WORLD-HERALD STAFF WRITER

Standing on the porch of his 83-year-old Sarpy County farmhouse near 98th Street and Giles Road, Floyd Durkop can see the last century blending into the new.

In recent years, Durkop has watched suburban housing spill over the horizon and onto farmland his family owned for more than 100 years.

Durkop grew up in a farmhouse that was torn down to make way for the housing development under construction across the road from where Durkop lives now.

Now into a new century, Durkop, 68, has decided it is time for him and his wife, Idora, to leave the farmhouse they acquired when they married 45 years ago.

Giles Road was but a dirt lane with barely another farmhouse in sight when the couple took over the 120-acre farm in 1954. Durkop's family had been on that land since 1892.

This spring, the Durkops will join suburbia, building a ranch-style home in the Mayfair development on a paved street that will be named after Floyd. Their farmhouse will be leveled and the land it stands on will become well-manicured lawns.

"This isn't farm ground any more,"

Durkop said, gazing over and beyond his acreage. "It is suburban land now. ... This is metropolitan Omaha now."

The size and shape of Omaha's expanding metropolitan area in the next century will depend upon the direction set by urban planners in 2000.

As more farmers like the Durkops concede the inevitable, the question is not whether Omaha's metro area will be big — but just how big.

Recent projections for Omaha's growth, considerably higher than even a few years ago, indicate the population of Douglas and Sarpy Counties will rise from its current 562,000 to one of three sizes — 585,000 or 725,000 or 877,000 — in the next 60 years.

The exact size will depend upon whether the area's population growth:

■ Follows a historic development pattern that would create higher populations in such surrounding bedroom communities as Blair, Fremont, Ashland, Plattsmouth and Nebraska City in Nebraska and Missouri Valley, Council Bluffs, Glenwood and Red Oak in Iowa. Each city would feed commuters into jobs in Omaha, which would continue to be separated from those communities by an existing buffer of open rural land.

■ Focuses into a larger suburbanized Omaha, directly connected to such surrounding communities as Council Bluffs, Bellevue, Papillion, La Vista, Fremont

and Blair. Commuters would continue to fill Omaha jobs from such expanded urban centers as Lincoln and Nebraska City.

■ Intensifies with high-rise apartment buildings along major corridors and in downtown sections of Omaha and Lincoln, creating two major urban population centers that could be connected by a high-speed rail transit system.

The higher population projections for 21st-century Omaha were prompted by the ability of the area's strong economy to create even more jobs than initially anticipated.

Recent population and job studies by the University of Nebraska-Lincoln's Bureau of Business Research posed a dilemma: Omaha's economy is capable of generating more jobs than the community can fill with population increasing at the current rate.

The bureau's studies indicated the number of jobs in the Omaha area could more than double from 330,611 in 1995 to 773,555 in 2050. The increase would create 250,000 more jobs in Douglas and Sarpy Counties than could be filled.

The situation left urban planners with questions: Why would companies create jobs if there weren't enough people to fill them? Wouldn't businesses simply move the jobs to where there are more people?

The questions have divided urban planners into two camps: those focusing on Omaha's practical growth

rate vs. those reaching for the area's potential growth rate.

Faced with the obstacle that Omaha's projected population growth would not produce enough workers to fill the number of jobs that could be created, Omaha's City Planning Department set out to find a way to attract more workers.

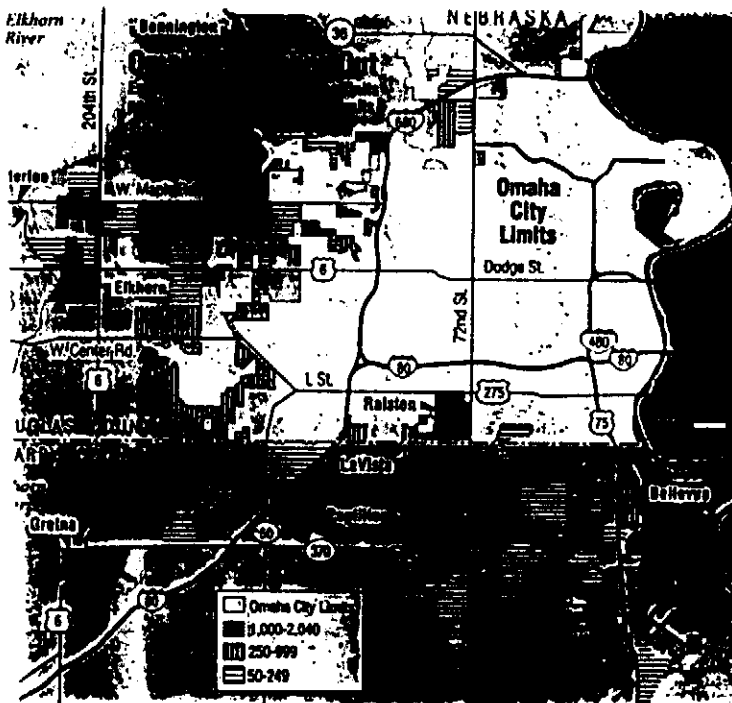
"One solution is that every Omaha job doesn't have to be filled by someone living in Douglas or Sarpy Counties," said Steve Jensen, the city's assistant planning director.

Instead, the commuting distance to jobs in Omaha could grow as the city grows, Jensen said. Commuters living in Blair, Council Bluffs, Fremont and Plattsmouth could fill Omaha's excess jobs.

"It's a simple solution because it doesn't require a lot of planning, but it will just happen" naturally, Jensen said. "It's how many communities like St. Louis, Detroit and Des Moines have grown nationwide."

The problem with such growth is that the open land that would remain between the city and the suburbs is not an efficient way for a city to provide services. It also creates the need for numerous expensive roadways to take commuters in and out of the city.

A second choice, would be more concentrated development that would maximize the use of existing sewer systems — a major component of new development — in such areas as Omaha, Papillion, Bellevue, Fremont, Blair and Nebraska City, Jensen said.



Lincoln, Fremont and Nebraska City, we wouldn't have to improve as many roadways because we are leaving rural areas rural and keeping urban areas urban," he said. "It requires fewer new roads and sewer plants."

The third approach would increase the housing density in the core of Omaha and Lincoln, with high-rise apartments in the downtown area and along major corridors, creating the highest population potential.

"The first thing we had to determine was whether Douglas and Sarpy Counties could physically accommodate a population of 877,000," Jensen said.

Why would someone commute from Fremont or Blair to a job in Omaha if they could live in Omaha?

"Drainage and the capacity of the sewer system are the major determinants of an area's population capacity," Jensen said. With expansion, the Papillion Creek Waste Water Treatment Plant could handle a population of millions in Douglas and Sarpy Counties, he said.

"We can fit that many people into the two counties if we change the pattern of how space is developed in those counties," Jensen said. "We have the ability to make Omaha grow big enough. The question is whether we have the will."

The Metropolitan Area Planning Agency, which projects the growth of Omaha's metro area, is skeptical that determination alone will bring Omaha the number of workers necessary to fill the jobs it can create.

MAPA's latest population, house-

See URBAN Page 9

■ URBAN

It Keeps Coming, Sweeping Away Rural Lifestyles

Continued from Page 2

hold and employment projections were up from previous estimates, but not as high as the UNL Bureau of Business Research's.

"More people are migrating into Omaha from various areas, but MA-

PA's population projections still don't meet the expectations of the number of jobs some think can be generated by the metro area," said Paul Mullin, the agency's program director. "We limited our employment figures by logical population forecasts. Companies won't create jobs if someone isn't here or going to be here to fill them."

MAPA must be practical in its population projects because the agency is responsible for designing a workable transportation system for the area at a reasonable cost, said Steve Wallace, the agency's transportation manager.

"We have been successful in getting some workers to Omaha to take jobs that have been created, but what would cause people to move here to fill the potential number of jobs that could be created?" Mullin said. "Why pay more if you can get workers to go somewhere else and work for less? And going to be able to afford to pay 10 percent more than Colorado or California just to get them to Nebraska?"

Brian Ardinger, executive director of Sarpy County Economic Development Corp., thinks so. Ardinger returned to Omaha last year after working for

several years in Hong Kong and California's Silicon Valley.

"I returned to Omaha because of its low cost of living, lack of overcrowding and congestion and the Midwest work ethic and friendliness," Ardinger said. "This area has to grow smartly to remain attractive, but I am optimistic that we can provide the population to reach our job potential."

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Summary: In Nebraska, 46 counties, mostly in the western part of the state, has seen enrollment in schools drop between 1988 and 1999. As enrollment slips, such counties face funding problems that can result in teacher and program cuts. The problem is linked to: 1) migration of young people to urban areas; 2) there are not a lot of jobs available for young people; 3) decreasing number of family ranches; 4) long-term enrollment is based on what happens with the local economy; 5) increased property valuations. Solutions: 1) offering upper level high school courses every other year, instead of annually; 2) distance learning (audio-video connections); 3) set up regional centers where students in rural districts would go for part of the day for upper level courses; 4) Legislative Bill 806, which provides additional state funds to school systems in sparsely populated areas; 5) consolidation and unification of schools.

Relevance: Depopulation in rural communities is an issue in Nebraska, and in others Midwest states that has to be handled to avoid the disintegration of farmlands. One of the causes of the rural-urban migration is linked to the lack of opportunities for young people to stay in their communities. A very important consideration for this problem is the school system. Without a strong educational system, Nebraska is jeopardizing social and economic rural life in the next decade. New initiatives to enhance the scholar system is a fundamental task to increase the interest in young people, as well as to protect the farmland value from speculators.

School Leaders Eye New Solutions

BY MICHAEL O'CONNOR
WORLD HERALD STAFF WRITER

Mullen, Neb. — A bumpy gravel road outside this tiny Sand Hills town cuts a path to the family ranch where twins Travis and James Warren have worked alongside their father since they were boys.

In a few years, the two Mullen High School seniors will be splitting up. Both will attend college, maybe even the same one. But after getting their degrees, Travis plans to return to the ranch, and James intends to pursue a career in art.

If Travis represents the hope for school districts like Mullen's, James is the reality. Students who graduate and never return to raise a family are a key reason why enrollment is falling in rural districts. The downward enrollment trend in Iowa and Nebraska is forecast to continue well

into this decade. The pattern also is evident in other Midwestern states.

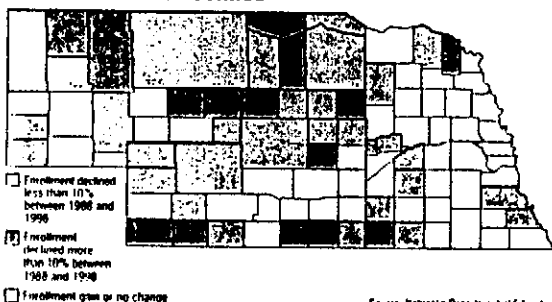
Nebraska's public school enrollment dropped 1.1 percent this school year to 282,822, while Iowa's fell 0.8 percent to 498,548.

How to cope with declining enrollment will be a major issue for rural districts over the next decade, particularly those in remote or sparsely populated areas. As enrollment slips, such districts face funding problems that can result in teacher and program cuts.

Some education officials argue that for the 185-student Mullen district — and dozens of other far-flung Nebraska school systems — consolidation isn't always an answer. Unlike rural districts in eastern Nebraska, some districts in the west are too far from neighboring districts to make consolidation easy or

See ENROLLMENT Page 2

K-12 Enrollment Declines



Source: Nebraska Department of Education
THE WORLD HERALD



TRAVIS WARREN: The Mullen High School senior plans to return to his family ranch after college. Twin brother James hopes to go into art, which probably would require him to live in a larger town.

School Leaders Prepare to Cope Over Next Decade

Continued from Page 1
practical.

"We've had a mind-set for a long time that there aren't any alternatives other than consolidation," Education Commissioner Doug Christensen said. "We've got to get more creative."

Solutions, some of which already are being tried, include offering upper-level high school courses every other year, instead of annually, and "distance learning," in which students share teachers through two-way audio-video connections.

The Iowa Department of Education is seeking state funds for a pilot program that would set up regional centers where students in rural districts would go for part of the day for upper-level courses such as advanced science and math.

Christensen said that's an approach Nebraska must consider.

In Nebraska, the Legislature has recognized that it can be tough for certain school districts to increase their efficiency — and potentially gain more state aid — by consolidating, said Connie Knoche, state-aid consultant for the Nebraska Department of Education.

A provision in Legislative Bill 806, approved three years ago, provides additional state funds to school systems in sparsely populated areas. Seventy-five school systems, mostly in western Nebraska, are eligible for the funds. Of those, 64 will receive the funding in the 2000-01 school year, totaling about \$25 million.

The additional funding isn't always enough, however, to offset decreases in state aid that can accompany declines in enrollment, Knoche said.

Eligibility for the additional money is based on enrollment, square miles of the district and the distance to a neighboring system that has a high school. Certain eligible districts don't receive the money for a number of reasons, including increased property valuations.

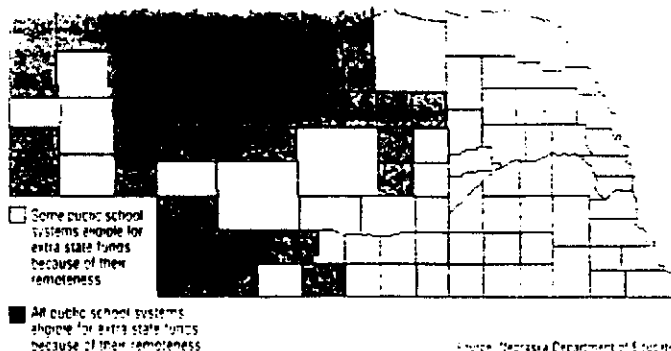
Mullen received the funding this school year but won't during the next school year, primarily because of increases in property valuations.

Mullen, a K-12 district in northwest Nebraska, is the only district in Hooker County. The nearest school building in a neighboring district is in Thedford, 25 miles to the east. Covering 1,386 square miles, the Mullen district is bigger than Rhode Island.

"Our only real option is to do the best we can with what we've got," Mullen Superintendent Bruce Blanchard said. "Any consolidation would mean some long rides for kids."

Some students already get on a bus about 6:30 a.m. to get to school by 8 a.m.

In Nebraska, 46 counties, mostly in



Source: Nebraska Department of Education
THE WORLD-HERALD

the western part of the state, saw enrollment drop between 1988 and 1998, according to the most recent figures.

Declining enrollment can bring pressure on school districts to consolidate, even those in sparsely populated areas. A bill has been introduced in the Nebraska Legislature that would eliminate the mostly rural elementary-only and secondary-only schools districts as of July 1.

Roger Hudson, who oversees school reorganization for the Nebraska Department of Education, said that while consolidation could be impractical for some rural districts, unification is an option.

Unification allows districts to keep individual school boards, buildings and sports teams while they share a common budget and tax rate, as well as staff and transportation.

Blanchard said his district has not ruled out unification.

Mullen's enrollment is about 185, down 25 percent from five years ago. Blanchard said the enrollment probably will drop gradually over the next few years and then perhaps stabilize. But the long-term enrollment forecast hinges on what happens with the local economy, Blanchard said.

There are not a lot of jobs available, he said. Mullen's businesses include two banks, four restaurants, a grocery, an auto parts store, several beauty shops and an insurance agency.

There's also ranching. But with a continued decrease in the number of family ranches, there are fewer opportunities for young people, Blanchard said.

Jerry Warren, Travis and James' father, is a third-generation Sand Hills rancher. He said he'd be pleased if his sons joined him on the ranch after college. But that's a decision they need to make for themselves, he said.

"I've seen it way too much where children come home to the ranch because it's what their parents wanted them to do," Jerry Warren said. "But children have to do what makes them happy. Ranching is not an easy life."

Travis and James have helped on the ranch for as long as they can remember. When the twins were about 6 they'd drive the pickup truck while their dad forked out hay for the cattle. Travis would take the wheel, and James

would work the pedals with his hands.

As they grew older, they took on bigger jobs, such as making sure the windmill water pumps were working so the cattle had enough to drink.

Now they fix fences, feed cattle and check cows to see whether they're pregnant.

On a recent afternoon, Travis and James jumped into their pickup truck after school for the 10-minute ride to the family ranch. Soon their school clothes — baggy pants, sweat shirts and tennis shoes — were replaced by tight-fitting Wranglers, old coats and pointy-toed roping boots.

James hopped into a pickup and, with the help of dogs Rascal and Tibi, flushed a dozen horses out of a pasture into a corral. The two boys and their father harnessed a horse named Sherm so they could deal with a cut on the horse's leg.

It was close to 5 p.m. The sun looked orange and fat as it hung low in the sky. A sharp wind blew across the Sand Hills as the father and sons finished with the horse.

Travis says he's looking forward to returning to the ranch after picking up a college degree, probably in agricultural business.

"There are people who have warned me that ranching might be going downhill," Travis said. "But I'd like to give it a shot."

James would like to study art in college and teach that subject at the high school level. While that could take him back to Mullen High, it's more likely that he'd end up in a larger Nebraska town such as North Platte or Lincoln, he said.

Bob Beitel, guidance counselor at Mullen High, said that out of the school's 25 seniors, probably five or fewer will settle in the district.

"Most are choosing careers that would require them to be in larger towns," he said.

James said he likes ranching and might return someday to help his brother.

"I was born on a ranch, raised on one," he said. "It's part of me."

But art is a lure. Along with teaching art, he wants to sell his own. Pencil drawings are his favorite.

"I just want to give it a shot," James said. "But I know I always have someplace to come home to."

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SECTION 2

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AND *Beyond*



January 28, 2000



Washington County new housing

Country Living

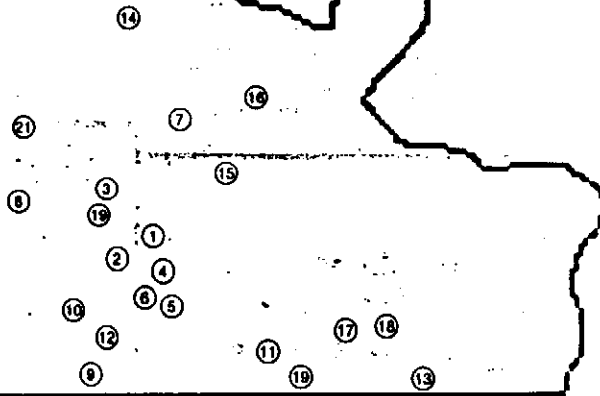
The following is a partial list of Washington County's rural subdivisions.

- | | |
|---------------------------------|------------------------------------|
| 1. Allen Hills Subdivision | 12. Nordstrom's Second Subdivision |
| 2. Lakeland | 13. Northwoods Estates |
| 3. Lakeview Estates No. 2 | 14. Oak Park |
| 4. Eagleview Subdivision | 15. Push's Subdivision |
| 5. Looking Glass Hills Addition | 16. Rolling Acres |
| 6. Sherwood Acres | 17. Spring Valley Subdivision |
| 7. Bur-Ridge Run | 18. Thomson Timbers |
| 8. Country Lands | 19. Surrey Hills |
| 9. Gottsch Subdivision | 20. Crest Ridge* |
| 10. Gylden Bakke Estates | 21. Cooper Wood* |
| 11. Kameo Estates | |

*These are two of the most recent subdivisions



Another new home: This is a common sight in many places in Washington County, but especially in its southeast corner.



New homes, new developments and a new look?

It's common knowledge there's plenty of new construction in southern Washington County, but do you know just how much things are changing?

BY RYAN THOMPSON

Reporter

In years past, State Highway 133, south of Blair, wound leisurely through mostly corn fields and cattle pastures as it carried travelers to Omaha. At the beginning of a new century, there are still crops and cattle in the fields of southern

Washington County, but acreages and housing subdivisions are sprouting faster than corn after a springtime shower.

The second largest community in the county isn't an incorporated town, instead it's Lakeland, a private housing development with more than 1,200 residents. Acres of new residential areas

aren't just confined to Highway 133. U.S. High 75 also has a number of new housing additions as do many of the hard surface roads connecting the two.

Developers and county officials attribute the housing spurt to an increasing number of people who work in Omaha, but prefer a more rural feel to where they live. Almost a decade long run of

prosperity in the business economy has provided the financial muscle to pay for the new housing. A farm economy languishing with low commodity prices has made farmers more apt to sell their land at a good price and move on to more profitable ventures.

To what degree southern Washington County becomes

urbanized in the future varies by who you talk to. Many of the people spoken to regarding the subject believe that this trend has just begun and it's more about the potential for growth than what has already occurred. As the Omaha metro area pushes further to the south and west,

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Washington County new housing

NEW LOOK from page 3

some believe that the strongest growth of the state's largest city may eventually turn north.

One of those people who think southern Washington County's growth has just begun is Fort Calhoun School District Superintendent Jerry Barabas.

He said his school district's enrollment has increased by three to four percent each year for the last few years — something not typical of rural

Nebraska school districts. The question that Barabas poses is how rural is the district is.

"More and more we're living in the footprint of Omaha," Barabas said. "It's difficult to say whether we're rural or not anymore."

The growth his district has

sustained and the good possibility for more in the future has its board looking at expanding the school's facilities to handle more incoming students.

"There's no crystal ball and it will depend on the economy, but we're looking for this trend to continue," he said.

"More and more we're living in the footprint of Omaha. It's difficult to say whether we're rural or not anymore."

—Jerry Barabas, Fort Calhoun School District Superintendent

A study by the Bureau of Educational Research and Field Service Department of Educational Administration of the University of Nebraska conducted a study on the Fort Calhoun School District beginning in 1997. The study said the district needs to prepare for more accelerated growth in the next decade if current demographic patterns persist. The accelerated growth for the

Fort Calhoun District already has a name—Shepherd's Meadow.

This subdivision is in the planning phase for the outskirts of Fort Calhoun. It could bring 140 homes to the community and Barabas said the homes would probably be medium priced—perfect for young families with school-aged children. He said for a model of what may be coming to southern Washington County, there are plenty examples out there.

"Look south and west of Omaha, that could be our future," Barabas said.

He believes by looking at what those areas have done with the growth that has come to them, Washington County may be able to avoid some of the mistakes they might have made.

Comprehensive plan

County officials said one of the biggest ways to avoid planning mistakes is to have a consulting firm look at the county's situation and help it design a comprehensive development plan. Doug Cook,

Washington County Planning Administrator, said the last plan of this kind was done in 1970. The county has grown almost 30 percent since then.

Cook said the new comprehensive plan will tell the county the best places for new subdivisions based on issues such as water availability, terrain and the land's suitability for agriculture.

"It'll hopefully tell us what should be and what shouldn't be developed," he said.

Cook said the new plan should also set architectural and landscape standards for any commercial buildings constructed in the rural areas of the county. The county is currently in the process of getting submittals from consulting firms and Cook said the county should have the new plan in two years. The new comprehensive plan could cost anywhere from \$20,000 to \$40,000, he said.

As a community planner, Cook said this county is in a unique situation.

"You have two different worlds—in the southeast you

have a lot of urban growth and in the northwest, it's basically still agriculturally centered," he said. "As a planner, it's a real challenge."

From his standpoint, Cook said one important point is making sure the county and its cities don't compete to offer land for homeowners to build on. He said cities need to continue to offer smaller lots while developers in the county should concentrate on offering plots larger than two acres. For the last several years, Cook said the county has been trying to keep all new acreages and subdivision homeowners in rural areas on lots at least two acres in size. This is needed basically to comply with state regulations regarding septic tanks.

County Supervisor Wes Petznick has been on the county board for the last 11 years and represents the Fort Calhoun area. He said the county may have been too slow in revamping the comprehensive plan.

"I've been pushing for it for a

NEW LOOK see page 6

NEW LOOK from page 4

number of years, it costs money and has been put off," Petznick said. "It may be should have been done sooner."

He hopes the plan will have input from a cross section of county residents. Petznick added that he believes in addition to the residential building that has occurred in the southern half of Washington County, there is room for commercial development. He said the area between Kennard and Fort Calhoun would be especially ideal for a dual residential-commercial zone.

Fewer farmers

Jim Peterson is the Washington County Extension Educator. He agreed with Cook's assessment that there are distinctly different regions in the county. As more and more commuters move into subdivisions

and acreages in the southern half of the county, Peterson said he sees his role as an extension educator changing to serve both farmers and acreage owners. He also believes he has a role in bringing the two sides together.

"We really thought we wouldn't see this change until later in life. We're the fourth generation to farm this land and probably the last."

—Lando Auch, southern Washington County farmer

He said there are two troubling aspects about the influx of residents to the southern half of the county. He said more people in the countryside equals fewer acres in crop production and less money being made from agriculture. According to the U.S. Census Bureau the growth rate for the county as a whole over the last two decades is slightly outpacing the average growth rates for the three largest communities. This means the number of people living in the countryside is increasing more compared to those living in urban settings.

Despite excellent prices for their farmland, Peterson said farmers are basically being kicked out of the area.

"It's taking land from farmers," he said. "You can say they're getting paid well for it, but often farmers don't own the land they're farming."

Shrinking amounts of farmland isn't a problem Washington County has a monopoly on. Peterson said other areas surrounding Omaha and around the country are seeing farmland turned to other uses.

Another concern that he has is a possible culture clash between the remaining farmers and their neighbors. Peterson

said some acreage owners like the idea a n d

advantages of living in the country, but have a hard time accepting the downsides of rural living.

Though the scenery and the peace of the country are appealing, he said the downsides of rural areas such as spraying and the smell of animals anger some of the newcomers unaccustomed to life on the farm.

"Typically the person is very interested in living in the country," Peterson said. "Some have farming experience, but many don't and sometimes the acreage owners think farmers are at their beck and call."

The Lando and Lorna Auch family has much experience living among newcomers to the country. They live and farm on ground near the Douglas County line that has been in the Auch family for more than a century. The Auches raise the usual crops—corn, beans, wheat.

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Washington County new housing

NEW LOOK from page 6

alfalfa and they keep a few stock cows. Their farm is surrounded by new houses and those in the midst of construction. They are also the only farm family in their section. Two years ago there were half a dozen. Most of their farming neighbors were older and retired with the money they received when they sold their land.

"We really thought we wouldn't see this change until later in life," Lando Auch said. "We're the fourth generation to farm this land and probably the last."

To cope with poorer prices for their crops, many farmers have expanded by buying or renting more land to produce more crops. Lando Auch said that's out of the question in his neighborhood with land prices going for

at least \$5,000 or \$6,000 per acre. He said he could buy land further north, but then there is the problem and expense of moving equipment over long distances to farm it.

They said all of their new neighbors are from Omaha or from other parts of the country. Many are friendly, the Auch said, but most aren't accustomed to life on the farm. Lando Auch said some don't realize that emergency services will have slower response times and in the winter, roads may be blocked for days at a time. He added that many aren't accustomed to the actions farmers take or the schedules they must follow to bring a crop in every year.

Both of the Auch said they feel a real sense of community is lacking because their lifestyle is much different from their neighbors now. Lorna Auch said she used to know all of the families in their section, now with their neighbors working in the city all day, there is less interaction. She said even the tradition of taking a plate of cookies or brownies to a new neighbor has died out.

Lando Auch said he used to work for some of the acreage owners, but he stopped because they were sometimes too demanding of time and because of liability concerns. Last Halloween a man called the Auch and wanted Lando to give a group of children a hay rack ride. Auch said he got the call because he was the only person around with a hay rack or large tractor anymore. Though he could have named his price for

providing the hay rack ride, Auch turned the offer down because of liability concerns.

The increasing numbers of acreage owners has had some benefits, the Auch admitted. Wheat straw used to be almost a waste product from their farm. Lando Auch said now there is a demand for the straw by people to use it in decorations and in landscaping.

Lando Auch said, "I sell between 500 and 600 wheat straw bales each year to stores and acreages. It's a better cash crop now than corn or beans."

It's also not the only new way the Auch have found to make money from their crops. They

"If you have marginal crop land, you can get good money for land that isn't that good."

--Mitch McGowan, Fort Calhoun-based developer

said instead of combining all of the corn, they leave some of it standing. It's then cut at ground level and tied into shocks and sold at a good price to homeowners who use it for decoration.

Despite their changing surroundings, the Auch said they'll farm their ground as long as they can. Lando Auch said he receives calls on a regular basis from people wanting to buy his farm, asking how much he wants to sell and his family has been on since 1899.

"How do I put a price tag on history," Lando Auch asked. "This is also my livelihood. If I sell this land, then what do I do or where do I go?"



A COMMON SIGHT: This grader is seen leveling ground near Lakeland for another subdivision.

Steady growth

Curt Hofer is a land developer who developed the Northwood Estates Subdivision which is just north of the Douglas County line on Highway 75. He estimated the average property in the Northwood Estates Subdivision is valued at around \$1 million.

Hofer said he doesn't think the housing growth in southern Washington County is too fast. He said he believes it's at a nice pace and that the area will retain its rural feel for sometime to come because of the high cost of infrastructure.

"Water is the issue until there is a rural water system," Hofer said. "That's the key for the future."

He said he hasn't detected any hostility between farmers and their new neighbors. Hofer said each group just needs to have a good understanding of the

concerns of the other. Hofer also noted that most of the development in the county, both acreages and subdivisions, seems to be sticking to corridors along Highways 133 and 75.

Mitch McGowan is a veteran Washington County land developer who has been in the business for a dozen years. He and his business partner, Dean

Fleming, are currently working on their latest development, Shannon Estates. Both said they try to leave the areas they develop as natural as possible and McGowan said most of the land he has developed is marginal as farm ground. They added that they have good

NEW LOOK see page 8

NEW LOOK from page 7

relationships with most of their farming neighbors.

"If you have marginal crop land, you can get good money for land that isn't that good," McGowan said.

He said county government now realizes that the housing boom in southern Washington County is inevitable. McGowan said at first he thinks the county tried to slow some of the growth down, but is now working to keep the growth controlled and orderly. Fleming said he believes the county is trying to work with all of the parties involved. McGowan added that he thinks the housing boom has also broadened Washington County's tax base.

Like Hofer, McGowan and Fleming agree that water is one of the keys to the further development of the area. Shannon Estates is hooked up to water from Blair's system which they said is a major selling point for the subdivision. McGowan said with Blair expanding its water coverage to the south and Omaha coming from the north, it won't be long before more development is possible due to better water supplies.

The most notable subdivision in the county is Lakeland which is just off of Highway 133 south of Blair. The homes there are spread apart, most with large backyards. A man-made lake is in the center of the subdivision and people who live there go fishing and swimming there in the warmer months.

The streets are narrow with steep hills that can make winter driving interesting. The roads are maintained by the dues residents pay to live there. Kennard and Fort Calhoun provide fire service and the sheriff's department provides law enforcement. In the summer, the subdivision pays for extra patrols to curb minor vandalism that has occurred in the past.

Lakeland sends its children to Blair for schooling. Water is provided by Lakeland Estates Water Company, which also supplies other nearby subdivisions. There is no grocery store, no gas station and no shortage of people wanting to live there.

This subdivision started as a retirement community in 1970 on ground that was previously

farmland. Now this private community has close to 250 homes and is second only to Blair in population, said Lakeland resident Eileen Breithaupt. She has lived in Lakeland since 1986 and serves on the community's board of directors. She has also seen Lakeland's population double in the time that she has lived there.

Like many of her neighbors, Breithaupt makes the 20 minute drive each day to work in Omaha. She said most of the people who live in Lakeland do so because the houses are spread out with lots of room in-between. Breithaupt said many people in the community have bought the lots around their homes to prevent anyone from building on them. Though there may be space in-between their homes,

"There is a real tight housing margin all over eastern Nebraska. We need the housing and we can't stand still."

-Matt Connealy, District 16 State Senator

Breithaupt said there is still a small town feel to the subdivision.

"I do feel this is a community where we look out for each other," she said.

She said they've never had many problems with chemical runoff or bad odors from neighboring farms. The only chemical problem they've had, Breithaupt said, were the chemicals some homeowners put on their lawns. One reason that Lakeland hasn't had too many problems with farmers is that there aren't many in the area anymore. The subdivision lies surrounded by other subdivisions and acreages. Lakeland's biggest conflict with a neighbor has been with another subdivision.

One recent issue that Lakeland faced was the development of the Crest Ridge Subdivision on its western border. Lakeland residents went before the county board of supervisors with concerns about the water runoff that might occur if Crest Ridge was allowed to progress as planned. It was eventually agreed to have the

new subdivision dig retention ponds to hold back water runoff.

"We feel the Crestview situation will be okay for Lakeland and we just have to hope there are no problems," Breithaupt said.

Has everything

One man who has a unique perspective on all of the development in Washington County is 16th District State Senator Matt Connealy who represents all of the county in the unicameral. He said the massive housing growth in southern Washington County is probably a positive development, but he added that agriculture does need to be protected.

"There is a real tight housing margin all over eastern Nebraska," Connealy said. "We need the housing and we can't stand still."

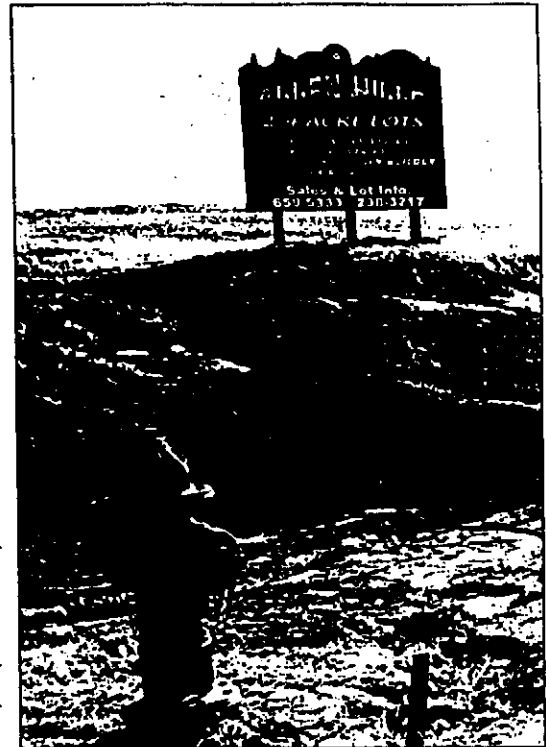
He also said the reduction of farmland may be as much a symptom of the slumping farm economy as the boom in the housing market.

As a state senator, he believes that his district has every type of community the state of Nebraska has to offer with the exception of the inner-city setting. Connealy said representing a district with a large number of both urban and rural residents gives him a unique perspective on issues that affect both groups. He doesn't believe the growth the county has seen will affect the redistricting of the 16th district next year.

As the contractors continue to build homes and earth movers turn more land from farm ground to housing plots, Peterson hopes to use his position as an extension educator to bring farmers, acreage owners and those who live in subdivisions together. He said he's trying to plan open houses at farms where farmers and their acreage owning neighbors can come together.

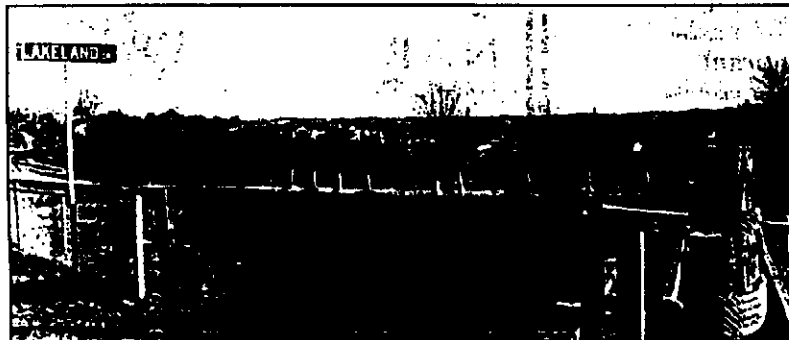
Cook also has ideas on the kind of things he would like to see in the county. One is called a planned unit development. He said it groups homes together with lots of open terrain around the group of homes.

"I'd like to see a 40-acre tract of land with houses put together with lots of greenery around them," Cook said. "That's my wish as a planner."



GOT WATER? Water availability is a major issue in the further development of the area, developers said. As the water systems of Blair and Omaha spread, so may the development between the two cities.

WELCOME HOME: This is the sight that the 1,200 people who call Lakeland home see when they come home each day after a drive on busy Highway 133.



Consequences of Sprawl

Definition and Regional Trends



Environmental Management Center

Brandywine Conservancy

May 13, 1999



*Delaware Valley Regional Planning
Commission*

Richard G. Bickel, AICP

Associate Director, Regional Planning

Southeastern Pennsylvania Density Change

- **Gross Population Density (pop/ total area)**

-- 1970 2.74 persons/acre

-- 1990 2.64 persons/acre (- 4%)

-- 1998 2.63 persons/acre (- 4%)

-- 2020 2.83 persons/acre* (+3%)

- **Net Residential Density (pop/residential**

area only) *forecasts

-- 1970 12.1 persons/acre

-- 1990 9.1 persons/acre (-25%)

-- 1995 8.5 persons/acre (-30%)

-- 2020 7.5 persons/acre* (-38%)

Regional Trends and Consequences –1970 to 1990

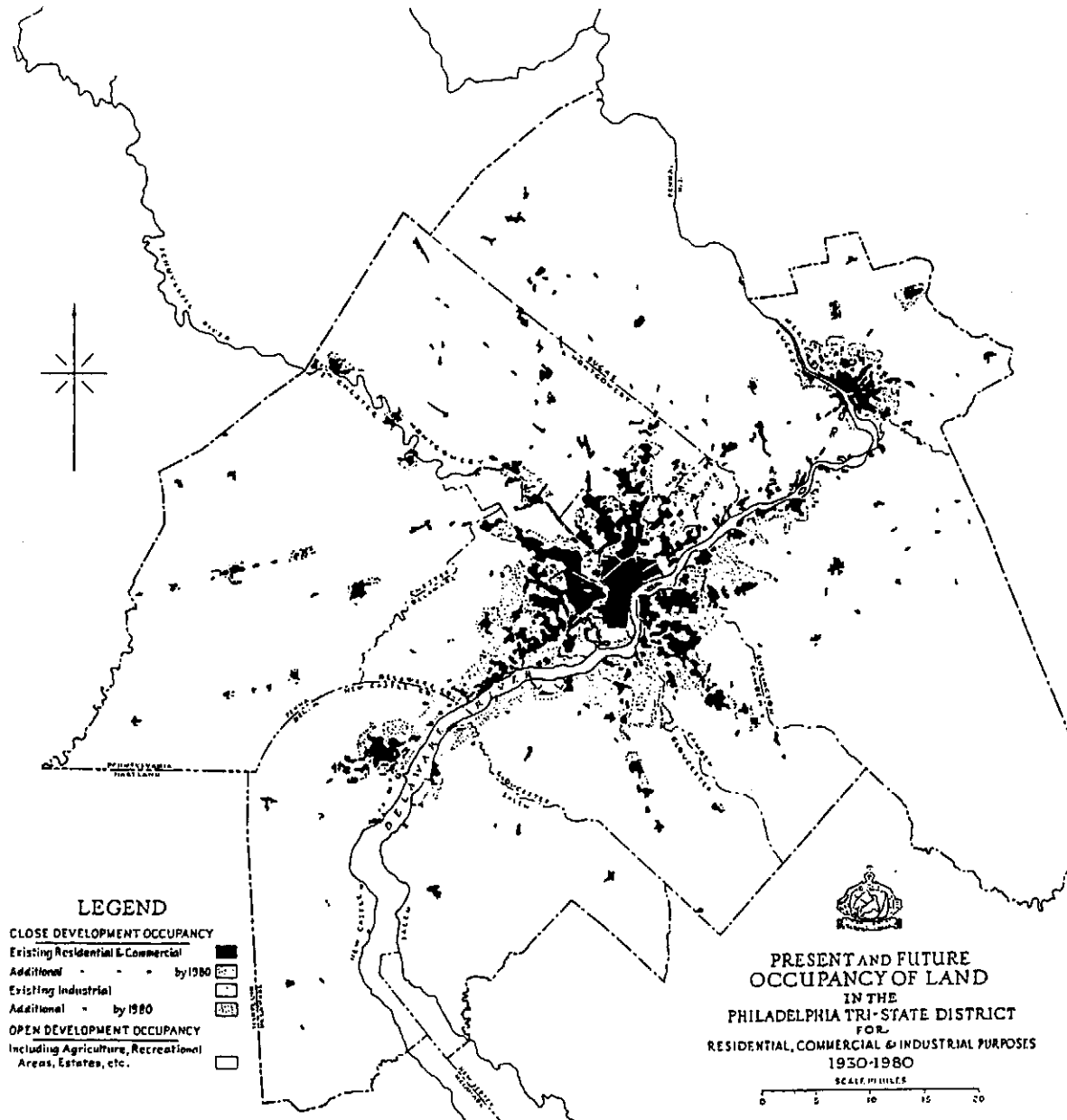
Travel Trends

- **Increasing Auto Travel:** Auto ownership +28%; vehicle trips +54%; vehicle travel +66%
- **Declining Public Transit Use:** From 24.6% to 13.6% (- 45%) of work trips

Consequences of Regional Trends

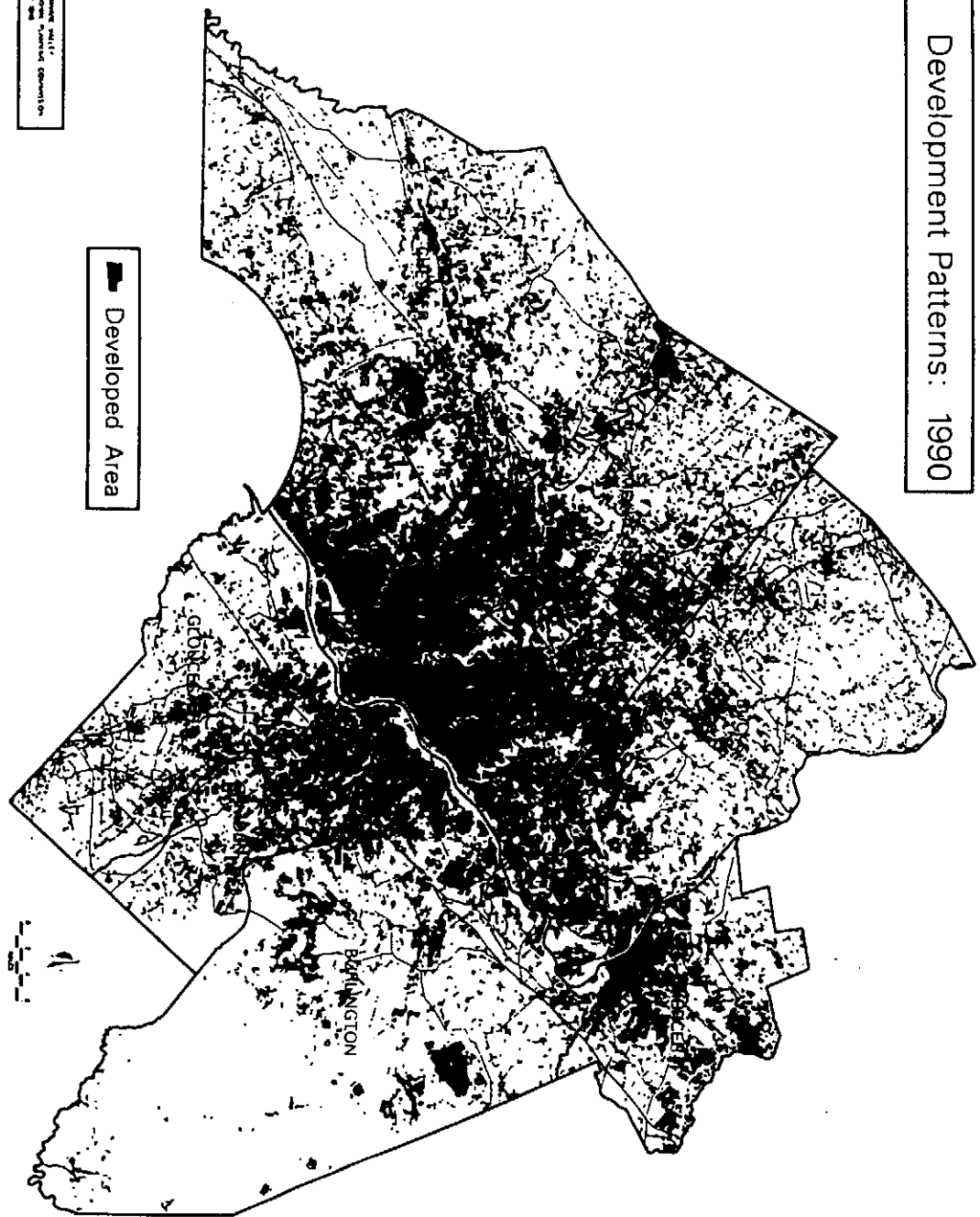
- Declining Core Cities
- Bypassed and Declining First Generation Suburbs
- Rapidly Expanding Outer Suburbs
- Knitting Together of Separate Regions

FIGURE II-5
FORECASTED LAND USE
1930-1980



Source: Regional Plan of the Philadelphia Tri-State District, 1932

1.3 Development Patterns: 1990



Glenn County
Planning and
Development
2011

Developed Area

“The Costs of Sprawl – Revisited”

Transit Cooperative Research Program

- Current Study of Sprawl and Its Consequences

Study Research Team:

- Center for Urban Policy Research (Rutgers);
The Brookings Institution; Parsons Brinckerhoff;
ECONorthwest
- Literature Review Completed – 1998
- National, County-Level Research on Sprawl
Impacts Underway – Completion Scheduled

September 2000

Sprawl's Primary Identifying Traits

Literature Review Found These Aggregations Upon Basic Sprawl Characteristics

- Leapfrog Development (Residential and Non-Residential Development Separated by Undeveloped Spaces)
- Unlimited Outward Extension (Beyond a Region's Existing Built-Up Areas)
- Low Residential Density (Scattered, Small Subdivisions and Individual Dwellings at Low Gross Densities)

Key Impacts of Sprawl

Literature Review Found That Sprawl

Impacts Primarily Affect:

- Land Losses (All Lands and Environmentally Sensitive Lands)
- Capital Infrastructure Costs (Roads, Sewer and Water)
- Transportation Use (VMT, Commuting Times, Auto/Transit Use)
- Quality of Life (Visual Character and Satisfaction of Place)
- Socioeconomic Aspects (Urban Tax Base Decline and Jobs, Workers, Housing Spatial Mismatches)

Positive Views of Sprawl

- Responds to Market Demand and Consumer Preferences for ~~Lower Density~~ Auto-Oriented Lifestyle
- Promotes Growth and Economic Development
- Fosters Housing Diversity and Choice
- Reduces Need for Public Transit System Expansion
- Results in Shorter Commute Times
- Fosters More Efficient Development of Leapfrogged Areas

Negative Views of Sprawl

- Consumes land, including farmland, natural features, historic sites and open spaces
- Promotes continued growth in auto trip purposes and greater congestion
- Works against use of public transit, ridesharing and other modes
- Discourages sense of community and neighborhood identity
- Worsens mobile source air pollution and increases energy consumption
- Increases infrastructure capital and operating costs
- Fosters urban area decline and fiscal stress

Where do we go from here?

Making Changes Happen

- New Federal Programs and State Legislative Initiatives
- Regional and County Plan Policies
- Local Government and Development Community Responses – (still the key actors to change “business as usual”)
- Public Support – the “grass roots”



SMART

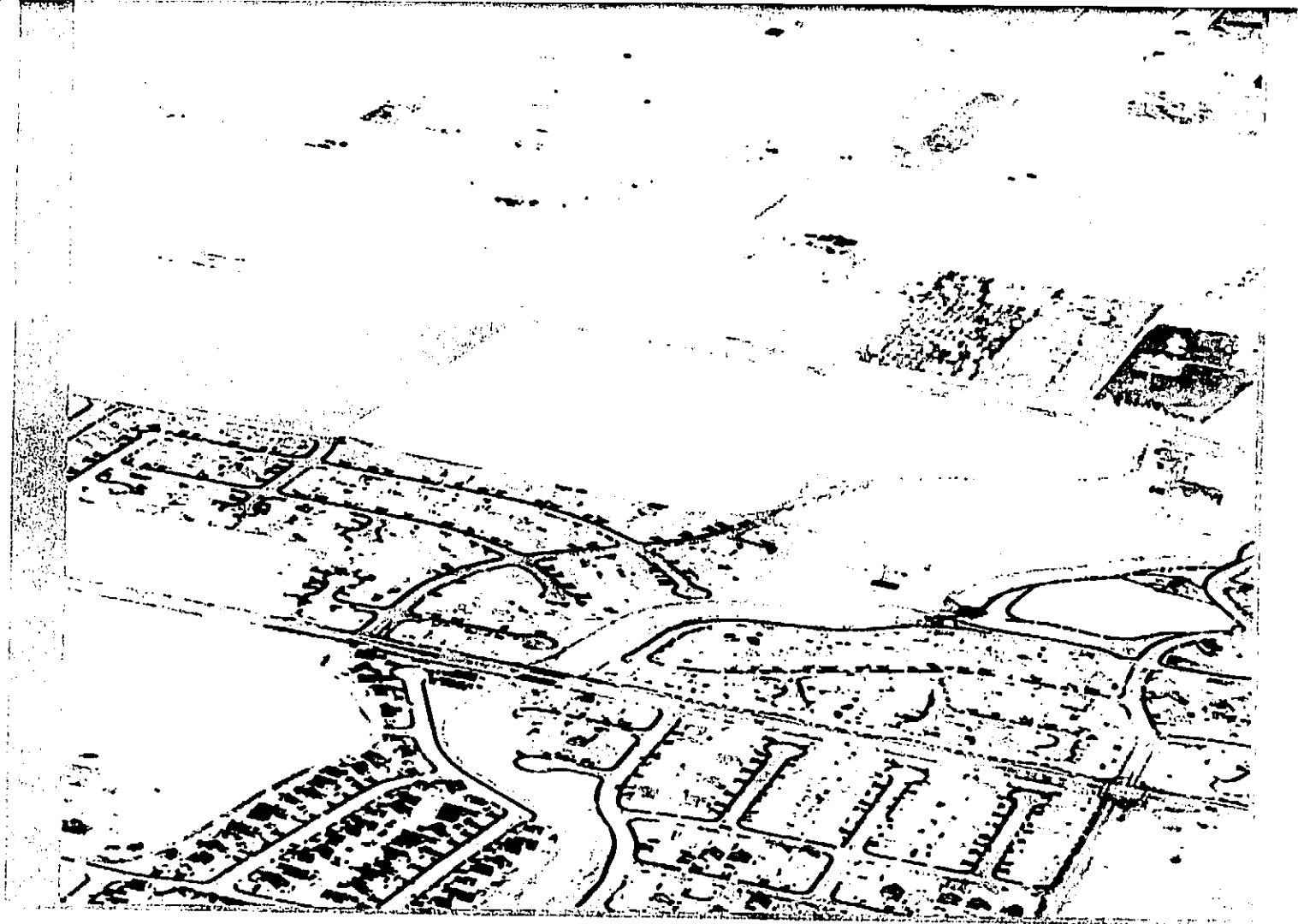
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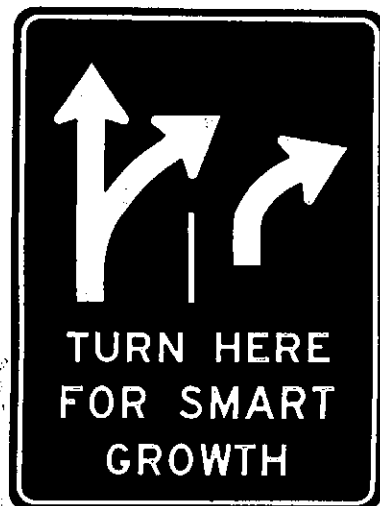
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resources and acknowledgments

This report is the Sierra Club's second annual report on sprawl. Last year's report was entitled "The Dark Side of the American Dream: The Costs and Consequences of Suburban Sprawl."

To read previous reports or for more information on our Challenge to Sprawl Campaign, please visit our Web site at: www.sierraclub.org/sprawl/

For general inquiries about our sprawl campaign, call the Sierra Club at (415) 977-5653 or (202) 547-1141. For media inquiries, contact Daniel Silverman, Media Relations Director, at (415) 977-5508.

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Though we wish to express our thanks to all who have contributed, this report represents the views of the Sierra Club. Any mistakes are, of course, our own.

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This report can be found on the Sierra Club web site at:
www.sierraclub.org/sprawl/report99



Testimony to Senate Environment and Public Works Committee

March 17, 1999

Steven Hayward, Senior Fellow, Pacific Research Institute for Public Policy

I am Steven Hayward, senior fellow with the Pacific Research Institute in San Francisco, and until a few weeks ago a visiting fellow in urban issues at the Heritage Foundation. The Pacific Research Institute studies a wide range of issues in political economy, and favors policies that employ market remedies and individual incentives. I have been conducting research and writing about growth management and environmental issues for more than ten years.



The best way to begin putting the current debate on urban sprawl into some context is to make recourse to that proverbial barometer of public sentiment, the taxi driver. Not long ago I was in a taxi on route from Lindbergh Field in St. Louis to an appointment in St. Charles County, which is where the suburban sprawl of the greater St. Louis area is taking place. Looking for some local insight, I asked the driver what he thought about what was going on there. "Man," he told me, "they're building so fast out here there isn't going to be any land left." I asked where he lived. "I live in the City of St. Louis," he told me; but he quickly added without any prompt from me: "But I'm going to move out here. The quality of life is so much better; you get much more value for your housing dollar."

This is what social psychologists have long termed "cognitive dissonance"—the ability to keep two contradictory thoughts in mind and be relatively untroubled by it. As Jim Johnson, recently retired as chairman of Fannie Mae, neatly summarizes it: The American people are against two things—they're against sprawl, and they're against density. What I want to suggest is that there is a lot of cognitive dissonance, misperception, and lack of proportion in the current discourse about sprawl, open space and agricultural land preservation, and urban form.

One should begin with a quick reference to aggregate land use statistics. The total amount of urbanized or built-up land is less than 5 percent of the total land area in the continental U.S., and the rate of land being developed, based on U.S. Geological Survey estimates, is about seven one-hundredths of one percent (0.07%). Some evidence suggests that the rate of "sprawl" is actually lower today than it was in the 1950s and 1960s. The "sprawl index," a simple comparison of population growth and the rate of urbanization, has actually declined since 1980. Moreover, since the end of World War II, the amount of land set aside for parks, wilderness, and wildlife has

grown twice as fast as urban areas. In 1969, there were 2.6 acres of conservation land for every acre of urbanized land; today there are about 4 acres of conservation land for every acre of urbanized land. (These figures exclude national parks and agricultural conservation land programs.) And private land conservation efforts are booming.

These kind of aggregate national statistics are almost irrelevant to the politics of the issue. I am reminded of President Roosevelt's famous quip to critics of the long-run effects of the New Deal: "People don't eat in the long run; they eat every day."

Similarly, nearly every piece of open space that yields to the bulldozer occurs in the line of sight of a populated area where people live now, and the change and disruption it brings locally trumps the fact that the land area in question represents a statistically miniscule portion of the whole.

The aversion to rapid change is the dominant social fact behind the controversy over sprawl, and it is enhanced by a second powerful social fact: the increasing latitude for choice that people have today. Thirty years ago, for example, our phones were the property of the monopoly phone company; today we choose our long distance provider. While the main story line of modern life is expanding choice and opportunity, rapid urban growth is seen as narrowing our range of choice and diminishing our control over our own destiny. In its most acute form, we are less able to choose when and where to drive because of traffic congestion. And when people do not have a sense that they can control events themselves, they earnestly wish that someone else—the government—would.

Most of the ideas that make up the conventional wisdom on the subject at the moment, such as urban growth boundaries and, to a lesser extent, the bundle of ideas that go under the banner of "smart growth," are misguided, because they misperceive much of what is happening in urban areas (especially the increase in traffic congestion), and as remedies they would be ineffective in solving the main problems associated with growth.

Explaining why this is so would take a lot longer than five minutes, so let me mention the single most important reason for being cautious about embracing ambitious land-use regulation schemes or other measures that will distort the land market. A century of experience with regulation of various kinds has taught us that regulation typically favors the affluent and the organized over the less affluent and less organized. There are few groups less organized or represented than the people who would benefit from the houses and jobs that do not yet exist. Many of the advocates of "smart growth" will tell you that this is not a debate about growth *per se*, but is a debate about the *form* growth should take. While I take them at their word at this, I think we are being naïve if we fail to recognize that growth management schemes can easily become the machinery of negation by existing residents. To pick a nearby example, the angry voters attending Fairfax County Commission meetings are not arguing over the *form* of development: they simply want less of it because, as several told the *Washington Post* a few months ago, our housing values are stagnant because the county is allowing too many homes to be built.

Everyone's favorite model for enlightened growth management these days—Portland, Oregon—is starting to show the same kind of exclusionary effects that have long been

observable in the boutique regions of Boulder, Colorado, and Santa Barbara and Marin Counties in California: disproportionately rising housing prices (see table below), and signs that in-migration is being deterred, which is no doubt what many Oregonians had in mind all along. The *Wall Street Journal* recently carried a short news item regarding the rising number of people moving out of Oregon—the only western state where this can be observed. (See attached clip.)

Federal policy, whether funding for open space purchases, or infrastructure policy such as ISTEA, should guard against the potential for exclusionary effects. This is very difficult to do. A more effective alternative to land use regulation would be variable rate road pricing, which would not only affect individual incentives for the time of day and amount of driving people do, but would also become a factor in site-selection decisions for business location. Both would help encourage more compact and efficient use of land and roads.

Median Home Prices				
	1990	1998	90-98% increase	Housing cost index*
Portland	79,500	160,600	102.0%	121.7
Salt Lake City	69,400	133,300	92.1%	96.5
Phoenix	84,000	121,900	45.1%	103.3
Las Vegas	93,000	130,800	40.6%	104.7
Denver	86,400	149,100	72.6%	103.4

* 1996 HCI, U.S. Census Bureau (median income related to median housing prices; US average = 100)

Note the contrast with the "sprawling" cities of Phoenix and Las Vegas.



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Historic and Ecological Resources Survey

Lancaster County
Nebraska



1985
Revised 1990

Prepared by the Lincoln-Lancaster
County Ecological Advisory Committee

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Appendix I - Follows Section XVII in this Resources report
Includes Lower Platte South NRD Properties for Public Access, Salt Valley
Lakes and the Nut Trees of Lincoln, Nebraska.

Appendix II - Grassland Inventory

This is in a separate binder and consists of all the maps prepared for each Native Grassland site included in this Grassland Inventory. Copies of Appendix II are available for review or study at all of the Assisting Departments and Agencies listed on page 6 of this Resources Survey.

Appendix III - Wildlife Inventory

This is a separate publication which inventories the animal life of Lancaster county.

Directional Growth Analysis

City of Lincoln & Lancaster County, Nebraska

***Report To The SuperCommons
November 22, 1996***

***Prepared By The
Lincoln-Lancaster County Planning Department***

LINCOLN



TIMOTHY M. STEWART, AICP
Planning Director

NEBRASKA'S CAPITAL CITY

ROBERT STEPHENS, Chair
City-County Planning Commission

TO: Mayor Johanns
Lincoln City Council
Lancaster County Commissioner
Lincoln Lancaster County Planning Commission

FROM: Tim Stewart, Planning Department

DATE: November 22, 1996

SUBJECT: Directional Growth

UNL Chancellor James Moeser, in his recent State of the University Address, cited an old Islamic Proverb: "We drink from wells we did not dig."

Planning the long range future of the community fits well with this proverb. Today, we enjoy a quality of life which has been built upon the wise decisions made long ago. As we think about the future of City of Lincoln and Lancaster County, the decisions we make today will determine how sweet the water will be for future generations.

The attached Directional Growth Analysis (DGA) is built upon a notion that good information results in good public decisions. Every effort has been made to provide accurate, fair and objective information, without bias. While the amount of information is very large, care has been taken to footnote assumptions and methods so that data may be independently tested and validated. We welcome comments and suggestions about both method and assumptions used in this report.

■ Insights Into the Community's Growth

The Directional Growth Analysis has yielded information which provides insight into our community's growth trends and patterns:

- Lincoln's population of 207,112 (1996) could grow to 283,631 without any increase in the Comprehensive Plan if the plan were fully developed under a Build Out Scenario (BOS). This increase of 36.9% would take 32 years to reach at a 1% annualized rate of growth but only 21 years if the rate of growth increases to 1.5%.

LINCOLN CITY-LANCASTER COUNTY PLANNING DEPARTMENT
555 South 10th Street • Lincoln, NE 68508 • (402) 441-7491 • FAX: 441-6377

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- The growth rate of Lancaster County over the past 100 years has averaged about 1% per year, but during the past 5 years the growth rate has increased to about 1.3%.
- The 1996 population of Lancaster County (230,126) support 27,386,068 square feet of occupied commercial space (retail, office and service) in the City of Lincoln, or about 119 square feet per person.
- The current Comprehensive Plan provides enough commercially designated land to support an additional 27,251,946 square feet of new commercial development, enough to support a County population of more than 450,000 people.

■ Growth and Capital Costs

Growth is expensive. Some costs, such as schools, parks, libraries and police and fire protection are independent from the direction of growth. Other costs, such as those for roads and utilities such as water, sewer and electric are sensitive to direction.

In considering the long range plan of the community, the DGA reveals that the directional sensitive costs are very expensive, ranging from \$10,777 per acre to more than \$17,545 per acre, depending on assumptions and variables. Yet the range of total costs for opening an additional 7.62 square miles of land for urbanization (\$84,343,250 to \$135,847,750) could easily be equaled or exceeded by the cost of the South and East Beltways (\$147,000,000 to \$231,000,000.) Because of these huge unknown costs, the fiscal analysis in the DGA is inconclusive in establishing a single preferred land use alternative.

■ Growth and Community Values

There are other values, in addition to fiscal cost, which are equally important to the future health of the City and have been considered in this analysis. These values include:

- **Urban Form.** The impact of growth upon the built environment, including the impact of growth on the transportation network.
- **Market.** The demand for land by the residential, commercial and industrial markets.
- **Environmental.** The impact of growth upon sensitive environmental resources.

■ Directional Growth Recommendations

The framing of the Directional Growth Analysis has involved a huge professional effort by the staff of the Planning Department and from many other City and County departments including the City Public Works and Utility Department and the Lincoln Electric System.

While this input has been indispensable in the formulation of the reports conclusions, the DGA recommendations that follow are those of the Planning Director alone:

1. Continue 90%/10% population ratio between Lincoln and Lancaster County.
2. Accept two land use options for further evaluation:
 - ✓ East at 70% and North at 30%
 - ✓ South at 35%, Southwest at 35% and North at 30%
3. Commit to construction of Salt Valley Relief Sewer.
4. Preserve Lincoln's growth potential by discouraging acreage development in the City's 3 mile jurisdiction.
5. Incorporate County Plan Task Force report into Comprehensive Plan.

Lincoln is a unique City. It is one community. It is not surrounded by separate independent taxing jurisdictions like Detroit, St. Louis, Denver or Kansas City. It does not have many people who live beyond the City's edge. Lincoln truly has the ability to control its future. Keeping the community whole and as one, now and in the future, is the foundation of the City-County Comprehensive Plan and is perhaps the sweetest water that can be given to future elected officials.

■ **Concluding Note of Thanks to the DGA Interdepartmental team**

As I mentioned above, this report could not have been prepared without the tireless effort of a team of excellent City employees from a number of different departments. Just a few of the individuals who deserve special recognition include:

City-County Planning Department

Kent Morgan, DGA Team Leader
 Steve Henrichsen
 Mike Brienzo
 Logan Christy
 Alan Griffin
 Kristine Stokes

Lincoln Water System

Jerry Obrist
 Nick McElvain

Wastewater Division

Gary Brandt
 Randy Wilson

Traffic Division

Roger Figard
 Virendra Singh
 Roger Ohlrich
 D.D. Smith
 Kelly Sieckmeyer

Lincoln Electric System

Ron Kratzer
 Russ Votava

The interdepartmental team succeeded because of the leadership and support of Dick Erixson, Public Works and Utilities, and Walt Canney, LES.

Exercise Due: March 8

Learning Objectives:

- Sort through the literature and select ten articles or books that are most relevant to your concerns about the issues of urbanization of rural areas and changes in landscape function.
- Scan or read these resource materials and prepare a short description of the information and why it is relevant to a broad audience interested in these issues.

Assignment:

Scan through the listed references for the course, and preferably find additional new resources that are not listed there. Read or peruse these resources, and write a short description of what they contain and why other people interested in these issues should consult them. Prepare a list of ten of these references, and be prepared to share this with class in a brief presentation as well as in written format. This should include a complete citation so others can find the work.

Examples:

Opie, John. 2000. *Ogallala: Water for a Dry Land*, Second Edition. Univ. Nebraska Press, Lincoln, Nebraska. 536 pp.

In a second edition of his now widely acclaimed book on the Ogallala aquifer, noted historian John Opie describes the environmental history of the region as well as the farming systems on the plains that have impacted this unique water resource. From the times of early irrigation to the arrival of industrial hog production, Opie outlines the relationships of people to resources, the challenges of multiple demands, and the potentials for keeping family farmers on the land as they use this resource into the future. John Opie is emeritus professor of history at New Jersey Institute of Technology.

Carrels, Peter. 1999. *Uphill against Water: The Great Dakota Water War*. Univ. Nebraska Press, Lincoln, Nebraska. 247 pp.

One of the few instances in our history when the Corps of Engineers and the Bureau of Reclamation was stalled in a major water project is described by Pete Carrels. His fast-moving description of the initiation of the massive Oahe dam project, the disillusioning of local farmers and citizens, and the continued support of politicians and business for the project makes a gripping story. This is one with an unpredictable ending, where the reader is carried through the months of negotiations with a clear notion of where the author's sympathy lies, but not with how the project will end. Author Carrels currently lives in South Dakota.

Editors' Note: These references were identified by students in Spring 2000 class, and supplement the Olson list on pp. 17-35 in Vol. 11 of this series.

Agronomy 896
Urbanization of Rural Landscapes
Annotated Resource List
Joel Connot
March 8, 2000

Title: *Why Urban Sprawl is Good*
Authors: Peter Gordon and Harry W. Richardson
Publisher: NA
Copyright: NA
ISBN: NA
Organization: Cascade Policy Institute 813 S.W. Alder, Suite 450 Portland, OR 97205
Web Address: <http://www.cascadepolicy.org/growth/gordon.htm>

Summary:

The authors are professors in the University of Southern California School of Urban Planning and Development. They highlight eight arguments why urban sprawl is not as bad as people portray. Citing there are several reasons that development occurs including the real reason, people want it too. Our society has inherent incentives that make development inevitable, like cheap petroleum in comparison to other parts of the world, deductible mortgage expenses and a trend to jobs leaving the city center.

Title: *Facts Versus Fantasy on Urban Sprawl*
Authors: Lloyd Billingsley
Publisher: NA
Copyright: NA
ISBN: NA
Organization: Pacific Research Institute
Web Address: <http://www.pacificresearch.org/action/action17.html>

Summary:

This website addresses some statistics associated with urban sprawl that gives us perspective on how much land is available for development. However, it does not quantify the amount of land area available that is suitable for both urban and agriculture development. It also does not quantify the amount of land that is too mountainous, dry, rocky, low or has inadequate water supplies or is overall inhabitable. It does remind us that the total developed areas of the country comprise less than 5 percent of the total land area and are only growing by .0006 percent (six thousandths of one percent). Overall an interesting site to gather information to reflect upon.

Title: Paying for Sprawl

Authors:

Publisher: NA

Copyright: American Planning Association

ISBN: NA

Organization: American Planning Association

Web Address: <http://www.planning.org/info/sprawl.htm>

Summary:

This website cover some of the usual targets of urban sprawl protesters, like traffic pollution, the disappearing landscape and a lack of sense of place. It also covers some figures that are not often discussed like the extremely large budget deficits that are caused when new areas are developed high costs of new streets, public utilities, and other public services are compounded by the fact that these houses are filled with families. This also means the added expenses of new schools and busing. Despite the cost of dwellings on the outskirts of these towns, they do not generate enough revenue to support themselves.

Title: *Beyond Malthus: Nineteen Dimensions of the Population Challenge*

Authors: Lester R. Brown, Gary Gardner, and Brian Halweil

Publisher: Worldwatch Institute

Copyright: 1999

ISBN: 0-393-31906-7

Summary:

The chapters of this book draw heavily on the on going research of the Worldwatch Institute. The study of the world's population and the amount that can be supported with current lifestyles is an interdisciplinary problem that gathers the interest of many people. The book originally intended to give the state of and a brief commentary on the sixteen best indicators of the worlds physical and human health. In the process of writing this book the researchers noticed something that had not be realized before a trend of "*demographic fatigue*". Demographic fatigue is the term to describe the trends of increases death rates in some countries. This can be attributed to overpopulation or to the spread of diseases like, HIV. This can drastically affect the population projections for a county. Countries with a projection to double or triple their population in the next generation could actually experience a decrease. The book describes the many factors affect overall population growth.

Title: *Land Use Planning Techniques and Policies*
Soil Science Society of America American Society of Agronomy Special
Publication Number 12

Publisher: Soil Science Society of America American Society of Agronomy
Copyright: 1984
ISBN: 0-89118-772-3

Summary:

This book consists of eight scientific papers on topics that are key to smart development. Topics range from the role of soils in site planning to global perspectives on land use using satellite remote sensing. It includes one very informative paper on the role soil plays in the environment and how important it is to consider in any development. There is also a companion chapter of controlling soil loss. Another chapter is on the Canadian Agriculture. Once though of as a limitless supply of agricultural land and production, a closer examination reveals that most of the areas with good quality soils have been developed. This book reassures our feelings that we need to conserve our resources.

Title: *Using Nighttime DMSP/OLS Images of City Lights to Estimate the Impact of Urban Land Use on Soil Resources in the United States*
Authors: Marc L. Imhoff, William T. Brown, Christopher D. Elvidge, Tera Paul, Elissa Levine, Maria V. Privalsky, and Virginia Brown
Publisher: Remote Sensing of Environment
Copyright: 1997
ISSN: 0034-4257

Summary:

The conversion of natural systems to agricultural uses has been done for the past 9000 years. Ag land is increasingly being developed into urban areas. A question was posed to see if we had reduced our ability to produce food by losing agricultural land to urban development. This is an article in a scientific remote sensing journal reviewing the process that was used to study the impact of urban development on our high quality soils. This was using DMPS/OLS satellite images that were collected at night. The extent of the urbanized areas was measured and then overlaid on soil map of the United States. According to this study 2.7 percent of the U.S. surface area is urbanized, it also appears that the most productive soils are being developed. States like California, Illinois, Florida and Wisconsin are at most risk, due to their higher populations and higher quality soils.

Title: *Holding Our Ground: Protecting America's Farms and Farmland*

Authors: Tom Daniels, Debra Bowers

Publisher: Island Press

Copyright: 1997

ISBN: 1-55963-482-0

Summary

This book is an excellent desk reference on farmland preservation. It discusses the challenges associated with farmland preservation and includes several approaches to saving farmland from unwanted or unneeded urban sprawl. Approaches include, higher density development, agricultural zoning, estate planning and the development of trusts to preserve farmland from being developed.

Title: *Public Values, Private Lands*

Author: Tim Lehman

Publisher: The University of North Carolina Press

Copyright: 1995

ISBN: 0-8078-4491-8

Summary

Public Values, Private Lands provides an excellent description of public policy in the United States and its affect on agriculture. Covering situations in agriculture that helped shape new deal politics, the reemergence of agricultural conservation, the federal protection of farmland and national studies on agricultural lands. This book reminds us that we are all connected to our agricultural lands. It is important that we take care in shaping our agricultural, environmental and other public policy to protect our resources. National policy, especially farm policy, plays a critical role in protecting our most valuable resources – agricultural land.

Title: *Checklist for Sustainable Landscape Management*
Authors: J.D. van Mansvelt, M.J. van der Lubbe
Publisher: Elsevier Science B.V.
Copyright: 1999
ISBN: 0-444-50159-2

Summary

This is a checklist of summarizing a study that was done in the 1990's in the European Union to protect rural areas from development, pollution and other encroachment. The process was research ways in which farmers; land managers and scientist could work together to better manage the resources. It was discovered that most of the farmers in the European Union had very little or no education in natural resource or environmental science. The farmers in this area are in control of most of the un-urbanized land in Europe; therefore they play a critical role in protecting the environment. One way of ensuring that land is not urbanized is to keep agriculture profitable. A lot of time is dedicated at looking for and at many types of production systems.

Title: How To Mess Up a Town
Authors: James Howard Kunstler
Publisher: Planning Commissioners Journal
Copyright: Winter 1995, Issue 17, page 20
WWW: <http://www.plannersweb.com/articles/kun068.html>

Summary

This is a short article written in the Planning Commissioners Journal telling the story of Saratoga, New York. Saratoga is very similar to other towns and cities across the United States. It experienced growth, accompanied by the rise in popularity of the automobile since World War II. As more people started to use the automobile for everyday errands around the city, the business section of town developed to receive that trend. The days of the compact development are long gone for many cities. There are too many problems associated with trying to develop a high density down town area. There is a development dilemma in the U.S., which has two components. The first is "Once you get the people there where are they going to park?" The second part is "How can you develop high density development with all this parking?"

Larry Cutforth
Annotated Resources List

1) Nassauer, Joan Iverson. 1997. Cultural sustainability: aligning aesthetics and ecology. In Joan Iverson Nassauer (Ed) *Placing Nature: Culture and Landscape Ecology*. Island Press, Washington, D.C. 67-84.

According to Nassauer, people have strong cultural norms about how attractive landscapes should look. A common criterion is the degree to which they display care. In the woods, care is shown by the lack of trash. Care in human systems is demonstrated by neatness. For example, farmers are expected to have fields with straight rows and no weeds. Nassauer makes a strong point that attractive landscapes are more likely to be valued and maintained by humans. Attractive landscapes are then a prerequisite to healthy ecological systems. Nassauer is a professor in the School of Natural Resources at the University of Michigan.

2) LaGro Jr., James A. 1996. Designing without nature: unsewered residential development in rural Wisconsin. *Landscape and Urban Planning*. 35:1-9.

Improvements in transportation infrastructure and technological advances have removed the physiological and distance constraints planned for by Ian McHarg in his classic book, *Design with Nature*. LaGro's paper focuses on the impacts of changing rural wastewater management technology on rural growth and public health in Wisconsin. Holding tanks and other alternative waste management systems to sanitary sewers have doubled the land area available in the state for development. People often do not maintain these systems, resulting in health and environmental problems. In contrast to initial predictions, these technologies have also allowed development to disperse more instead of encouraging in-filling. Waste management is an important consideration in the management of urban sprawl.

3) LaGro Jr., James A. 1994. Population growth beyond the urban fringe: implications for rural land use policy. *Landscape and Urban Planning*. 28: 143-158.

This paper presents an analysis of population growth and urban development within a rural county close to New York City. Spatial analyses showed that the expansion of urban area in the county increased by eight times as much as the population over the period of 1968 to 1985. Although minimizing further landscape fragmentation is a desirable goal, the author believes that research needs to clearly demonstrate that land-use spatial patterns directly affect environmental quality and human quality of life and unregulated land markets lead to environmental degradation. LaGro is currently a professor of landscape architecture and urban and regional planning at the University of Wisconsin-Madison.

4) Dimond, Chris. 1998. Made for walkin'. *American City and County*. July: 42-54.

This article describes many successful efforts to revitalize downtown areas by improving their aesthetics and access. A common trend is to make downtown areas more pedestrian friendly to create a sense of community, convenience, and safety. Common elements of these approaches include green spaces, better lighting, pedestrian plazas, and

walking trails that connect the suburbs with downtown. Case studies are presented from many different cities in the article.

5) Peiser, Richard B. 1989. *Density and urban sprawl*. Land Economics. 65 (3):193-204.

Peiser argues that an open land market with discontinuous development promotes higher density development. To test this assertion, the author selected two case studies in the Washington metro area and one near Dallas. Theoretically, in-fill parcels increase in value faster than at the urban fringe. As a result, developers must build at a higher density to achieve the same rate of return in these areas. Although Peiser's reasoning is supported somewhat for the Dallas area, low density zoning in the D.C. area limited in-fill development. The author uses the results to justify the support of an open land market instead of growth regulation.

6) Fumagalli, Vito. 1994. *Landscapes of Fear: Perceptions of Nature and the City in the Middle Ages*. Polity Press, Cambridge, UK. 221 pp.

Besides having a great title, this book describes attitudes toward the environment during the Middle Ages. Although this book is a bit dry and probably intended for an academic audience, it provides an interesting look into the development of cities and factors leading to the widescale clearing of wilderness during this period in Europe. Fumagalli compiled 30 years of his work into this book, which was originally published in Italian.

7) *The Dynamics of the Dispersed City: Geographic and Planning Perspectives on Waterloo Region*. 1996. Edited by Pierre Filion, Trudi Bunting, and Kevin Curtis. Department of Geography, University of Waterloo. 401 pp.

This book is an in-depth case study of urban development issues in the Waterloo-Kitchener, Ontario area. It covers the past history of the area, the trends and associated problems of dispersed growth; attempts to encourage in-fill development; planning initiatives and problems, and other issues common to urban development from different perspectives. These objective and well-balanced reports would be a valuable reference for cities and groups attempting to manage dispersed urban growth.

8) *The Exploding Metropolis*. 1958. Edited by the Editors of Fortune. Doubleday and Company, Inc. Garden City, New York. 193 pp.

The problems associated with urban sprawl today were accurately forecasted in this book forty years ago. It is distressing to read in this book about the pace and impacts of development in California in the 50's and then consider how much it has developed since that time. The book has chapters on perceptions of the city, the impact of the car on urban development, and urban sprawl. People interested in urban development would find this book a good history lesson. Urban sprawl is obviously not a recent phenomenon.

9) *Detwyler, T.R. and M.G. Marcus. 1972. Urbanization and Environment: The Physical Geography of the City. Duxbury Press, Belmont, CA. 285 pp.*

The purpose of this book is to demonstrate how man has changed the natural environment by urbanization and how physical processes influence the growth of cities. Chapters on topography, climate, water, vegetation, and soils give the reader a good introduction to environmental processes in the city. The writing is easy to understand and concise throughout the book.

10) *Rapoport, Amos. 1982. The Meaning of the Built Environment. Sage Publications, Beverly Hills.*

The overall purpose of this book is to help understand how people respond to the environment. Many examples of feelings toward different environments are described in the first chapter. For example, high rise apartments are often perceived as indicators of low-income people, signs of growth, and negating the rural atmosphere of the suburbs. People often base their judgements on these initial reactions, which direct further actions. The other chapters in the book focus on the intricacies of environmental perception and judgement from a social psychological perspective.

Smith, Zachary A. 1989. Groundwater in the West. Academic Press, Inc. San Diego, Ca. 308pp.

Author Smith's book gives a state by state account of groundwater for 19 western states. The book examines the use, management, laws and politics of groundwater in the west. Chapter 10 is devoted to the state of Nebraska whose portion of the High Plains aquifer is greater than that of any High Plains state. This book should be of value to students, those involved in policy making, and anyone seeking information on this important resource. Author Smith is in the Department of Political Science at the University of Hawaii.

Wills, Jonathan and Warner, Karen. 1993. Innocent Passage : The Wreck Of The Tanker Braer. Mainstream Publishing, Edinburgh and London. 192pp.

This book describes in detail the shipwreck of the oil tanker, Braer, which broke up in the Bay of Quendale at the Shetland Islands. It is a day by day account of the massive pollution which resulted as well the worst January storms in 100 years which swept the oil away saving the islands from total disaster. Illustrations of the pollution effects on wildlife are in several chapters of the book. The authors felt the disaster could have been avoided by using simple safety rules and existing technology. This book would be of interest to anyone interested in the effects of large oil spills. Jonathan Wills has lived in Shetland Islands on and off since age 15.

Vella, Tony. 1975. Food Co-ops For Small Groups. Workman Publishing Company. New York, New York. 173 pp.

Tony Vella writes a description of procedures which can be implemented to set up food co-operatives and operating patterns for co-operatives. These groups involve pooling of time, energy, and egos in a joint effort to obtain food economically. It reads easily and would be useful for information to establish a co-op or to learn more about a specific function such as buying directly from farmers or buying produce of the best quality. Tony Vella is one of the founders of New York City's largest volunteer food co-ops. He is a new culture journalist covering consumer affairs.

Dunlap, Thomas R. 1988. Saving America's Wildlife. Princeton University Press. Princeton, New Jersey. 222pp

Thoma Dunlap writes of American nature myths of the last century and compares current ideas about nature and wild animals . He discusses the transition to a wildlife policy, new ideas, values, ecology, and new attitudes toward nature. It concludes with writing about saving the species and finding equilibrium in nature. The book reads easily and would be of interest to anyone involved or interested in nature. Author Dunlap is a historian at Virginia Polytechnic Institute and State University.

Facklam, Howard and Margery. 1990. *Plants: Extinction or Survival?* Enslow Publishers, Hillside, NJ. 96 pp.

Howard and Margery Facklam's book is aimed at those who take plants for granted and illustrates how important plants are for life and how easily they can be wiped out. Diversity is a key to plant survival and results from the combination of genes in the plant called germoplasm which is constantly changing. As an example, they point out the potato plants of Ireland were all of one kind and blight caused total crop failure and the widespread famine. The book is relatively short and easy reading with several illustrations. The authors have extensive backgrounds in science and education.

Jordan, Cora. 1997. *Neighbor Law: Fences, Trees, Boundaries, & Noise*, Second Edition. Nolo Press, Berkeley, Ca. 500 pp.

This book covers a multitude of situations a property owner could encounter in their relationships with neighbors. It includes occurrences that are important to both urban and rural residents. Written by attorney Cora Jordan, the book includes applicable laws, suggested handling of complaints, mediation, and suit procedures. The primary subject material covers occurrences related to fences, trees, boundaries, and noise. Examples include such things as easements, obstruction of view, who owns what, and encroachment. I would recommend this book for everyone as it gives a good understanding of a property owner's rights and also how your actions affect your neighbor.

Pombo, Richard and Farah, Joseph. 1996. *This Land is Our Land: How To End The War On Private Property*. St. Martin's Press, New York. 212pp.

The authors are congressman Richard Pombo, and the former editor in chief of the Sacramento Union, Joseph Farah. The book explains the importance of property rights and shows how government and large institutions pursue their own agenda while ignoring the constitution and other documents usually to make money at the expense of others. It is easy reading and includes testimonials of property owners who have had such experiences. Pointing out that the private property owner is the true steward of the land, the book attempts to link ecological safety with property ownership.

Setterberg, Fred and Shavelson, Lonny. 1993. *Toxic Nation*. John Wiley & Sons, Inc. New York. 288pp.

Based on a three year study of North America's most toxic communities, the authors write about the rebellion against contamination. It deals with people who have faced the struggle of the health effects of contamination and their uprising against the causes. It is relatively easy reading and includes case by case examples of contamination. It also includes accounts of individuals who have undertaken grassroots movements which are now having a positive impact on national policy. The author, Fred Setterberg, is a professional writer and Lonny Shavelson is a photojournalist, writer, and physician.

Pringle, Laurence. 1988. Rain Of Troubles : The Science And Politics Of Acid Rain. MacMillan Publishing Company, New York. 121 pp.

This book describes how acid rain is formed , is transported, and how it affects life on land and water. The author then discusses how it can be controlled and how economic and political forces have delayed corrective action. The book contains many illustrations, is not long , and reads rather quickly. Included are a number of specific examples of cases and factors which exacerbate its effects such as wind and water movement. It concludes with the remedies and politics of acid rain. Laurence Pringle trained as a wildlife biologist, was a science teacher, writer, and photographer.

Woodruff, Archibald M. 1980. The Farm & The City : Rivals Or Allies. Prentice Hall Inc. Englewood Cliffs, New Jersey. 184 pp.

This reading is similar to the text being used in our class. It covers loss of farmland, forces causing population changes, private sector involvement, government involvement, the urban problem , the farm problem, environmental effects, and landscape effects. It suggests both urban and farm dwellers may want to combine forces to prevent urban sprawl to protect their own interests. The author is an educator, urban land economist, and advisor to the government.

www.1000fom.org

This is the home page of the 1000 Friends of Minnesota, a group concerned with the urban sprawl in that state. From here, there are links to pages about smart growth, green corridor, activist tools, and publications, as well as pages giving more information on the group and their events calendar.

www.greendesign.net

This site connects you to different aspects of "green" building techniques. For instance, one connection takes you to Green Clips where you can sign up to get the latest articles on green building techniques via e-mail. They also have a searchable database where you can type in a topic and search for articles from their files.

www.west.net/~prince/index.html

This site was supposedly on sustainable architecture, building and culture but was not accessible. www.west.net gets you to a west coast Internet server with typical news, sports, entertainment, finance, and weather options. It is not worth your time as a source.

www.greenbuilder.com is a site on the ecological design and environmental architecture. It has links for sustainable building, green real estate listings, a sustainable sources bookstore, and other information sites. A good general source.

www.urbanecology.org.au/cue.html is the website for Urban Ecology Australia. The site itself has limited information, but has links for visitors, publications, and some specific links for some of their designs. This would be a good source for a very narrow interest group.

www.greenchannel.com/slt/metabtxt.htm was not found.

www.greenchannel.com is the homepage for an England based conservation group. This would be a good source for England specific information.

www.newdream.org is the homepage for the Center for a New American Dream. From this site you can connect to sites on food, business, international, transportation, and population information. It would be a very good general source with wide variety of quality information.

www.northwestwatch.org is the home page of the Northwest Environment Watch, an independent research and publishing organization. They are involved in supporting a sustainable economy in the Pacific Northwest. The information seemed cheesy and region specific. It would be a possible source for northwest United States specific information.

www.rprogress.org is the homepage of the Redefining Progress group which is involved with environmental tax reform. They have information regarding taxation and legislation pointed toward

better stewardship of the environment. It would be a source to check for legal/legislative information.

www.sustainabledevelopment.org offers links to several sites and is a resource center for sustainable development information.

This page offers numerous links for further information plus a search feature to increase the user's available information. It would be an excellent site for information gathered from different places.

1) Title: Ethical Land Use. Principles of policy and planning.

Author: Timothy Beatley

The Johns Hopkins University Press, 1994. 302 pp.

ISBN:0-8018-4698-6

Abstract:

The premise of the book is that all land use decisions –whether to build an interstate highway or maintain a suburban lawn with chemical fertilizers- invariably involve ethical choices. Many such decisions were made on narrow legal, technical, or economic grounds rather than on full consideration of their complex ethical and moral dimensions. Some of the conflictive questions that the author comes out are: should a community preserve or develop the remaining wetlands within its jurisdiction? Should a local government allow low-income housing to be built in an affluent neighborhood? The author concludes by proposing a practical set of principles for ethical land use to guide future policy and planning.

2) Title: Ecology of fear. Los Angeles and the imagination of disaster.

Author: Mike Davis

Vintage Books, New York, 1994. 484 pp.

ISBN: 0-375-70607-0

Abstract:

This book point out the lack of planning in big cities, such as in Los Angeles, California. The author cited a phrase from the Los Angeles Times published in 1934: "No place in Earth offers greater security to life and greater freedom from natural disasters than Southern California". Therefore, some of our more important decisions in terms of urban planning have been based on false premises, which have caused both material and humans losses.

3) Title: The Clustered World : How We Live, What We Buy, and What It All Means About Who We Are

Author: Maichael J. Weiss

Little Brown & Company, 384 pages 1 Ed edition (January 2000)

ISBN: 0316929204

Abstract:

This is an interesting book about demography, markets and social decision-making in developed countries. The author established 62 clusters that define the social groups around the world based on their tastes, and lifestyle. Thus, people from Madrid could be more related to people in Toronto, or La Provence, than with people living in Barcelona. This approach allows a more understandable behavior of the humans in terms of planning, and why some irrational decisions are taken, even though the possible negative effects of them.

4) Title: Structural Determinants of Urbanization in Asia and Latin America, 1950- 1970

Author: Glenn Firebaugh

Journal: American Sociological Review, Vol. 44, No. 2. (Apr., 1979), pp. 199-215.

Abstract:

"Why is the world becoming increasingly urban? The primary reason is economic development, but economic development alone is inadequate for explaining urbanization in the Third World. Theoretical arguments and fragmentary empirical evidence suggest that, in the underdeveloped regions of Asia and Latin America, urbanization is caused by adverse rural conditions as well as by economic development. Data for 27 Asian and Latin American nations in 1960 and 1970 provide evidence that two rural conditions, high agricultural density and plantation agriculture, spur urbanization in underdeveloped regions, independent of the effects of economic development and prior urbanization in these regions."

5) Title: Urban Ecology: Urbanization and Systems of Cities

Author: Franklin D. Wilson

Journal: Annual Review of Sociology, Vol. 10. (1984), pp. 283-307.

Abstract:

"This paper reviews the literature on the nature and extent of interrelations among cities in advanced industrial societies. It summarizes contemporary population distribution and redistribution trends in these societies and their causes. Finally, it attempts to identify some of the most important issues for the development of a comparative theory of urbanization."

6) Title: Structural Determinants of Third World Urban Change: An Ecological and Political Economic Analysis

Author: Bruce London

Journal: American Sociological Review, Vol. 52, No. 1. (Feb., 1987), pp. 28-43.

Abstract:

"Quantitative, cross-national studies of peripheral urbanization have been rooted in human ecology or political economy. Studies in the human ecology tradition cite rural adversity as a major determinant of Third World urban growth. Studies in the political economy mode emphasize economic dependency. This paper (a) argues that no quantitative analysis of Third World urbanization can be complete if it fails to incorporate determinants suggested by one or the other theory and (b) conducts such a "complete" quantitative, cross-national analysis, which examines simultaneously both rural adversity and dependency as predictors of urban change. Findings suggest that both factors are important."

7) Title: Family Formation and Urbanization

Author: Daniel Courgeau

Journal: Population: An English Selection, Vol. 44, No. 1. (Sep., 1989), pp. 123-146.

Abstract:

"Although migration is almost always attributed to economic causes, in fact its demographic motives are often important. Migration influences both an individual's future marriage and family patterns--people leave home more readily when they are single, and are more ready to produce children in societies in which fertility is high. The author demonstrates how migration affects behavior patterns and how certain behavior patterns may induce migration."

8) Web page:<http://www.aloha.net/~jhanson/page55.htm>

Title: Food, land, population and the U.S. economy.

Author: David Pimentel Cornell University and Mario Giampietro Istituto Nazionale dell; Nutrizione, Rome, 1994.

Abstract:

"The aim of this report is to increase the awareness of policy makers and the public of the importance of the interaction between population growth, self-sufficiency in food production, standard of living and, ultimately, national security."

9) Title: Lightening the Tread of Population on the Land: American Examples

Author: Paul E. Waggoner, Jesse H. Ausubel, Iddo K. Wernick

Journal: Population and Development Review, Vol. 22, No. 3. (Sep., 1996), pp. 531-545.

Abstract:

"People transform land by building, logging, and farming. The less land humans use, the more remains in its natural state. The authors search the past century for principles and trends influencing land use in the United States and contemplate the future when Americans might number an additional 100 million. Examples from American cities, counties, and states suggest that land covered by the built environment increases less than in proportion to population. For example, despite the rising use of paper relative to gross national product, the declining use of lumber combined with improved forestry kept the area of forest land fairly steady as population rose. Similarly, rising yields and changing tastes have countered the impact of rising population and wealth on cropland area. All told, a lightening tread of Americans on the land in the next century could spare for nature over 90 million hectares, an area equal to 100 times the size of Yellowstone National Park."

A Balloon Ride Exercise: Vision of the Future

An exercise in imaging a sustainable future:

- *Learning objectives* are to move into the future, imagine an infrastructure and functioning city according to precepts of sustainable land and resource use, with emphasis on employment, desirable housing opportunities, and quality of life for all citizens of the community.
- *A visioning session* is begun with moving everyone 20 years into the future, climbing into the basket of a hot-air balloon at the west county line of Lancaster County, and moving up to 3,000 feet elevation to drift slowly across the community, observing what is below.
- *Prompting by the group leader* includes pointing out key landscape or built-environment features that will help place the group, e.g. "looking to the north you can see Branched Oak Lake about ten miles away" or "directly below us you can see the main downtown area of Lincoln and O Street running from west to east."
- *Envisioning the future* is a response to the group leader's questions, "From this point, what do you see? What structures are there? Do you see vehicles and a transportation system? What is the apparent mix of activities?"

[Note: This exercise, with introductory comments and 20 sites for viewing the future city, plus discussing the results after the activity, takes about 45 minutes. The responses or visions of people from each of the sites were then compiled into one list. Needless to say, there is a range of different visions for the city. These could be discussed in depth for each site, compromises reached by the group, and a composite vision of a desirable future gleaned from the results. This was not done in March, 2000]

Results of the March 1, 2000 exercise, and lessons learned:

- *Results of the observations from the balloon* are summarized on the next seven pages. These are taken verbatim from the student response pages, with editing only for clarity of statements. There is a wide range of different opinions about what a sustainable future city would look like. The current results would require fairly lengthy discussion to allow the group to arrive at consensus.
- *Lessons learned from the exercise:* It appears that many in the group are unwilling or unable to project very far into the future. Perhaps it was the group leader's use of too many familiar landmarks that restricted people's ability to abandon the current reality and project into the future? Is it possible that a 20-year time frame is too long, far beyond the framework in which people are used to thinking? [In a previous experience with 18-22 year old students in Norway, we found that 20 years was too long a time frame for them to imagine what they would be doing -- 5 years would probably have been more appropriate. In a session with older graduate students, a similar exercise was highly successful, as they envisioned a community center for demonstration, teaching, and marketing organic foods and products]

Summarized by Charles Francis (June 20, 2000)
(Thanks to Geir Lieblein, Ag University of Norway, for this idea)

A compilation of people's visions as they looked down from each of vantage points, from 3000 feet elevation, at the city of Lincoln and its environs. The ride started on West O Street.

1. West O at county line, down on I-80:
 - new solar cars that are navigated by satellite, green fields & trees
 - mixed farms, vegetable production, trees, open space
 - mixed farmland, shared residential developments
 - clustered dwellings, farms and riparian areas intact, I80 a public transportation corridor, not one person/car
 - farm areas with clusters of homes in pastures, roads lined with trees, water tower for rural water district
 - still agricultural land, expanded recreational areas
 - Playmore Ballroom preserved, green belt around city
 - dwellings, concentrated community, green, parks, part of green belt, ag area
 - no change of significance from today
 - aesthetically arranged parkway
 - development along O as main arterial, electric bus running, limited east/west development
2. View north toward Branched Oak reservoir, valley up 79
 - mostly farmland with green space along major n-s drainage, some cluster development that's enlarged the towns
 - small settlements integrating waterways with recreation facilities
 - no major change - mix of farmland and 3-5 acre homesites
 - area of windmills, reservoir areas, increased density of dwellings
 - clustered homes with open green space, bike trails connecting Branched Oak, Pawnee lakes
 - Branched Oak perhaps enhanced, expanded recreational areas, not residential, I80 6 lanes
 - Emerald now a large town with shopping & industry, more roads for farmers to get their produce in to cities
 - Branched Oak -- needs hospital, watercourses & tributaries bordered by farms
 - hilltop development, mixed farm ground, mass transit system that moves people to and around the city, similar to a radial highway
 - forested corridors along waterways, farmland, light traffic
 - water is blue & clear
3. View south across small town, elevator, following rail lines toward town
 - green belt for Lincoln, bikers on the old rail path
 - rail lines, Conestoga lake, meandering streams, commuter trains, some cluster development
 - increased rail traffic, increased efficiency of transportation of goods & services, no development near lakes
 - division of green areas & expansion of Emerald railroad has more trucks for local use
 - lakes enhanced, town enlarged to 3000 or so, densely populated, small lots & row houses, with green space more mixed in
 - high density housing with parks

- new zoo for Lincoln, more windmills, lakes
- Emerald remains static, commercial uses on both sides of O st, with major users abutting the interstate
- absence of the railways, utilization of recreation center areas and public spaces
- continued development along the e-w corridor, cluster villages, preserving open spaces to the south

4. West O Street, looking down on Capitol Beach

- open space reaching along I80
- commercial and industrial development, surrounded by green spaces
- commercial uses on both sides of O St., no residential growth
- industrial area, surrounded by parks, high density of highways
- Capitol Beach preserved, move airport to consolidated site between Lincoln & Omaha, maybe in Wahoo area
- filled in & densely populated, railroad goes around city, not through the middle
- still open space and water has been filled in back of the airport
- railroad has become a hub terminal for interconnections with airport
- little change in this area, too low to develop extensively, possible station for commuter railway
- commercial land
- clustered housing with open green space on the old railroad yard

5. View north toward airport, commercial land, science park

- trams or shuttles to airport from Walmart parking lot, bright jets with clean fuel
- bus to airport, no planting around to avoid conflict with airport
- light rail delivery of passengers to airport
- farmland around airport, light rail from railroad hub, along the corridor has some industrial development
- fully industrialized and a rail spur to serve it from Omaha, downtown Lincoln on south to Beatrice
- regular bus service to airport and back, housing develops between I80 spur going south
- airport now vacated, now tech industry
- peripheral boundary of a Metro (subway)
- residential development north of Highlands, existing transportation corridors remain, more commercial by airport
- continuation of farmland, increased rail & other transportation from different parts of Lincoln to airport
- rail into town from airport, north of airport is cluster development and fields to the west

6. View south across Pioneers Park, appears to be 1500 acres in size

- bike trail to PP, increased park size to north and south of the drainage
- expansion of PP for recreation use, swimming, ice skating
- single family construction north of Van Dorn up to A, commercial north of A
- high density of dwellings, surrounded by parks and recreational areas
- amusement park adjacent to PP, "Six Flags" type

- residences, not acreages, regular bus service
- more homes circling the park and very open vista into Lincoln, there are open spaces surrounding the park with trails
- more consolidated housing, retail connected with railroad hub
- extension of light rail, higher density development on now flood plain areas
- large forest, prairie, unlandscaped development
- green farming, vegetables, around the park

7. View north to stadium

- stadium with #1 banners all around
- commercial, open space in low areas
- increased foot traffic over railroad yard & increased downtown foot traffic
- filled in with industrial linked with I80- corridor or new railroad
- more clustering of homes with green space
- baseball field and adequate parking lots to west
- dome over stadium, no billboards, UNL expanded to fair grounds
- high concentration of cars and buses
- 4 additional championships
- removal of stadium to somewhere east of Lincoln along I80
- development moving north

8. View south toward green strip, Wilderness Park

- greenbelt that goes way south, development stops at 77 and by the YMCA soccer fields, remainder is farm fields
- public transportation to the recreation area and new urbanized communities
- acreage development, major commercial at the bypass and new south bypass
- residential and historical areas remain, another subway ring between downtown and suburbs
- acreages
- WP protected, but 4-lane e-w across it with elevation and culverts for trails & wildlife
- more divided highway and big green open space with mixed cluster homes and thriving WP
- green corridors connected particularly along tributaries and WP & Salt Creek to Hickman
- small farms, large acreages, perhaps increased development of organic farms
- farmland, mixed enterprises, community centers
- bike trails, bus lines with commuters from outlying towns

9. View below of the downtown

- gardens on rooftops producing food for local residents, Haymarket strong
- vibrant downtown, public transportation, light rail or buses, green space in floodplain
- increased popularity of foot traffic in downtown, light rail stations, more usage of old downtown office space
- another New York City Central Park
- dense living in downtown with a park surrounded by small shops and with walking areas
- residential development downtown, no new green space except at Antelope Valley, higher density housing

- more parks & garages, refurbished mall space
- high concentration of offices, people & transportation
- Antelope Creek opened up, not much change in the core area
- newly developed shopping center, atrium, no parking downtown, parking on the periphery, & trolley leading to the center
- vibrant downtown, many more people living there, light rail bus line running in and out

10. View north toward fairground & beyond

- development out that way
- mixed use on both sides of 27th & I80, farms north on 27th, half mile north of I80
- all this area is transformed to commercial, bus transportation & subway
- state fairgrounds moved, now unl, then greenbelt
- Antelope Valley new road, 27th street and connected to I80, regular bus service
- has more streets and farms out to north, some green areas & trail
- commercial & retail & industrial
- extended 27th to I80, housing developments on ridges, public use wetlands
- little traffic, urban development
- Antelope Valley has revitalized the downtown area, water is clean and the area is green

11. View south over housing, malls

- green fields around Southpoint
- mall and compact development
- single family dwellings, some offices
- Jensen Park as center for outward spokes of green ways interconnected to WP, Stevens Creek, Roca
- dense housing with much green space with farms
- infilled with residential areas, improved arterial grid, a few 4-5 lane streets through
- high density housing, green space
- parks & farms & commercial, boundary of the town
- mixed use development south to Saltillo
- more densely developed, multi family housing, mixed with public spaces
- small farms, where local people are helping with CSAs

12. View north across East Campus

- fair bit of this land developed
- should be reflective of ag development to north
- Boosalis park is completed
- residential area, mixed with industrial
- rail system between campuses and on to Omaha
- more high-rise buildings, residential, north hospital
- Holdrege now a wide corridor with buses, street cars for commuters
- another large corridor of green intertwined with cemeteries
- connection of the two campuses with light rail
- bike path between campuses

- green campus with new buildings, esp. the Chuck Francis Regional Center

13. View below on O Street

- Gateway revitalized
- wooded corridor, small stores
- less traffic congestion due to light rail
- Gateway Mall is gone, dense housing with few shops below, with many small streets, short backyards, and lots of trees
- O st elevated through lanes out to 84th st, down to 70th
- more new office buildings, some high rises
- cemeteries, mall, highway across this area, high commercial density, subway e-w
- major O st improvements out to 84th
- housing on either side of O st
- mass transit, lots of people on their bicycles

14, View south over hospitals, malls, Holmes Lake

- additional acreages
- more parks interspersed with some new malls
- major commercial at 84th & H2
- residential area & library complex
- more commercial business
- built around lake, arterials & links to allow circulation south
- lake open with large green space around it
- hospitals, assorted residential
- new development will be ecological models
- streets, little traffic
- green spaces between buildings with trees

15. View north to major highway

- 35 wind generators that produce the energy for NE
- 77 has cluster development an entire field of wind & solar generators, recycling center
- landfill reverted back to Boosalis Park, small residential acreages or large size lots
- development in clusters along 77 with 1000s more windmills
- 77 commercial development, 4-lane highway to Cornhusker
- development to Ceresco, green space near businesses at interstate & 77
- industries, parks
- development out to Arbor & I80, farms north of I80
- elimination of most business on Cornhusker, more open space
- like to think we'd see the edge of the city

16. View below of SECC & O St.

- new urbanized cluster development
- further education centers
- start of mixed use in Steven's Creek

- SECC, gardens, museum
- residential housing, with commercial use nearby
- intense commercial development e-w along O st
- SECC has doubled but more green space around it
- offices, new hospital, retail & commercial, apartments mixed with green space
- continued controlled expansion
- bus transportation
- office buildings with green on roofs

17. View south toward Walton

- biker trail expanded, beltway has allowed all the trucks to stay out of Lincoln
- golf courses, housing development, Walton is infill development
- potential beltway, acreages, small truck farms, light rail
- housing, golf courses, large corridor of green public transportation has spared the beltway
- Walton larger with more homes & few commercial buildings, rail spur close by
- housing 50% open & 50% built, beltway, compact development
- some small lakes, bike trail, expensive housing, preserved green space
- tower & green belt & waste disposal
- urban village of Walton, beltway & farms, compact
- less agriculture, beltway, further urban expansion
- no beltway, farms with a hard edge to city

18. View north to Waverly

- mass transit to Ashland, then on to Omaha
- Waverly more integrated with Lincoln, public transportation routes developed
- commercial & housing east of 84th, expanded Waverly
- industrial, lakes, parks
- all developed with preserved green space
- residential, farms gone, schools, parks
- Waverly a large town, along rail from Omaha
- lake & recreation facilities
- light rail, continuous development, Waverly part of Lincoln
- water tower, ag land
- green farms around the town

19. View into countryside and south

- biker trail, small specialized farms
- beltway, farms mixed
- light rail, small self-contained farms
- public transportation spared us beltway, historic farms preserved and used for education as well as working farms
- large highway but buffered from farmland
- farms unchanged, trail extended, beltway complete
- beltway, more golf courses, some green space

- residential concentrated
- parkway drive on west side of the creek bounding Stevens Creek park
- extension of public transportation with continued farms
- no beltway, creative development with cluster housing

20. View east along O and toward Omaha and Platte River

- farmland with the hope that valuing this as farms
- prime development for newer & smaller communities integrated with public transportation
- acreages
- Sierra Club + farm + small communities + The Land Institute
- farms, acreages, churches
- no change except 4-lane East O st.
- small acreages have filled in with more homes but with green areas
- general mix along public light rail, highway turned into local connections
- not many large farms, too much urban development
- downtown development in Eagle
- clear air and water with small green patches